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GIOVANA MONTEIRO GOMES

A Roadmap Structure to Integrate Consumer Behaviour for Circular Economy in Apparel Retail Companies

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Revised Version

Ph. D. Thesis presented to the Graduate Programme in Production Engineering at the São Carlos School of Engineering, University of São Paulo, to obtain the degree of Doctor of Science.

Area: Processes and Operations' Management

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GOMES, G. M. **A Roadmap Structure to Integrate Consumer Behaviour for Circular Economy in Apparel Retail Companies**. 2022. 296 f. Thesis - São Carlos School of Engineering, University of São Paulo, São Carlos, 2022.

Abstract

The textile industry influences traditions and lifestyles, having a crucial role in socio-cultural, political and economic dimensions. However, the textile industry is also responsible for extensive social and environmental impacts. The Circular Economy, as a disruptive economic model, presents solutions that prevent such impacts and intend to generate positive influences on society and the natural environment. Therefore, Circular Fashion, a new textile economy, encompasses stakeholders throughout the value chain, with a particular interest in the engagement of apparel consumers. This research aims to contribute to the promotion of the engagement of apparel consumers in circular consumption systems. To achieve that, a combination of methodological approaches was employed, including a systematic literature review on consumer behaviour and circular economy, a survey among Brazilian and Dutch apparel consumers, interviews with Brazilian apparel companies, and roadmap structure development. The results were presented in article format, gathering five papers. The first paper comprises the mapping of the Brazilian apparel value chain from a multi-level perspective, as well as its opportunities and challenges for the transition to a circular economy. The second, is the validation of the environmental psychology application in the circular economy field. The third, is the identification of consumers' circular mindsets, behaviours, influencing factors and their role in circular consumption systems. The fourth, is the support that values, beliefs, and norms can predict consumer behaviour towards circular apparel, both in Brazil and in the Netherlands. At last, integrating the previous results, a roadmap structure was developed (fifth paper), gathering consumer behaviour, circular business model design, and communication and marketing strategies to guide apparel companies in engaging their consumers. This research, therefore, contributes to the field of consumer behaviour in the circular economy context and promotes consumer engagement in apparel circular consumption systems, assisting apparel brands to implement the circular economy's business models and principles.

Keywords: Circular economy. Apparel industry. Consumer. Behaviour. Mindset. Engagement. Circular Business Model. Communication and marketing.

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Resumo

A indústria têxtil influencia tradições e estilos de vida, tendo um papel crucial nas dimensões sociocultural, política e econômica. No entanto, a indústria têxtil também é responsável por amplos impactos sociais e ambientais. A Economia Circular, como modelo econômico disruptivo, apresenta soluções que previnem tais impactos e pretendem gerar influências positivas para a sociedade e o meio ambiente. Senso assim, a Moda Circular, uma nova economia têxtil, engloba *stakeholders* em toda a cadeia de valor, com especial interesse no engajamento dos consumidores de vestuário. Esta pesquisa visa contribuir para a promoção do engajamento dos consumidores de vestuário em sistemas de consumo circular. Para isso, uma combinação de abordagens metodológicas foi empregada, incluindo uma revisão bibliográfica sistemática sobre comportamento do consumidor e economia circular, uma *survey* entre consumidores de vestuário brasileiros e holandeses, entrevistas com empresas brasileiras de vestuário e desenvolvimento de uma estrutura de *roadmap*. Os resultados foram apresentados em formato de artigo, reunindo cinco artigos. O primeiro artigo compreende o mapeamento da cadeia de valor de vestuário brasileiro em uma perspectiva multinível, bem como suas oportunidades e desafios para a transição para uma economia circular. O segundo, apresenta a validação da aplicação da psicologia ambiental no campo da economia circular. O terceiro, a identificação dos *mindsets* e comportamentos circulares dos consumidores, fatores de influência e o seus papeis nos sistemas de consumo circular. O quarto, confirma que valores, crenças e normas podem prever o comportamento do consumidor em relação ao vestuário circular, tanto no Brasil quanto na Holanda. Por fim, integrando os resultados anteriores, no quinto artigo foi desenvolvida uma estrutura de *roadmap*, reunindo comportamento do consumidor, *design* de modelos de negócio circulares e estratégias de comunicação e *marketing* para orientar as empresas de vestuário engajando seus consumidores. Esta pesquisa, portanto, contribui para o campo do comportamento do consumidor no contexto da economia circular e promove o engajamento do consumidor em sistemas de consumo circular de vestuário, auxiliando as marcas de vestuário a implementar os modelos de negócios e princípios da economia circular.

Palavras-chave: Economia circular. Indústria de vestuário. Consumidor. Comportamento. Mindset. Engajamento. Modelo de negócio circular. Comunicação e marketing.

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List of Abbreviations and Acronyms

ABDI	Agência Brasileira de Desenvolvimento Industrial
ABIT	Associação Brasileira da Indústria Têxtil e de Confecção
BM	Business Model
BSI	British Standards Institution
CBM	Circular Business Model
CE	Circular Economy
CNI	Confederação Nacional da Indústria
CSR	Corporate Social Responsibility
KPI	Key Performance Indicator
MDIC	Ministério da Indústria, Comércio Exterior e Serviços
NAM	Norm-Activation-Model
PPE	Personal Protective Equipment
PSS	Product-Service System
SEBRAE	Serviço Brasileiro de Apoio às Micro e Pequenas Empresas
SME	Small and Medium Enterprises
TPB	Theory of Planned Behaviour
UN	United Nations
USA	United States of America
UK	United Kingdom
VBN	Value-Belief-Norm Theory
WHO	World Health Organization
WTO	World Trade Organization

Summary

1. Introduction

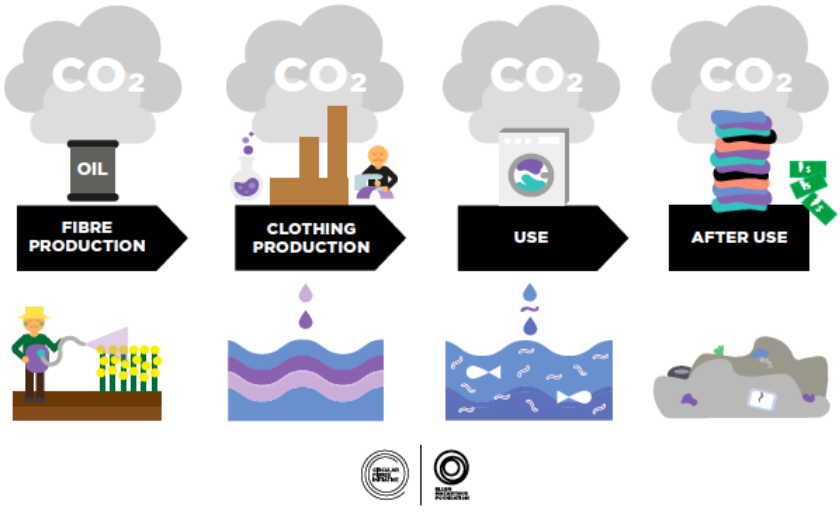
1.1. Context

The Textile Industry is one of the oldest and largest industries in the globe, and it is also hugely globalised (KEANE; TE VELDE, 2008). Brenton and Hoppe (2007) identified key features that validate the role of the textile industry in the global economy, them being: (1) *large number of unskilled labour absorbed by the sector*; (2) *low investment costs, but rapid expansion and return capital to invest in other sectors*; and, (3) *importation of state-of-the-art technologies allowed by the exportation of textile goods, which culminates in the market growth*.

Also, regardless of economic activities or production and exportation patterns, the textile industry is present across the world due to a human necessity of apparel and other textile uses (e.g., hospital and military). Therefore, this sector plays an important role, not only for the economy, but for social, cultural and political dimensions as well, being able to influence costumes, traditions, and trends, and even influence people's lifestyle over time (FUJITA; JORENTE, 2015).

However, the fashion industry is responsible for high environmental and social negative impacts, such as a critical pollution footprint, as the result of raw materials used (e.g.: petroleum, to manufacture polyester, or pesticides used on crops), workplace abuses, energy and water-intensive processes, the use of solvents, dyes and toxic materials, among others (CLAUDIO, 2007; FLETCHER, 2014). Its impact also includes processes in the use and after use phases, such as water and energy consumption (Figure 1).

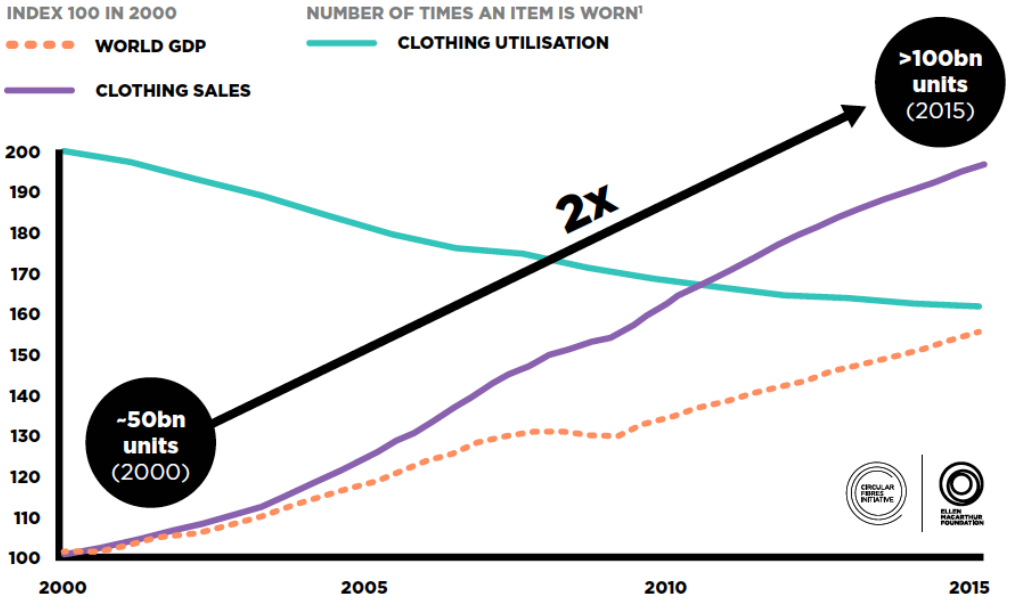
Figure 1: Impacts of the clothing life cycle.



Source: Ellen MacArthur Foundation (2017a).

Additionally, the fast fashion industry stimulates the demand for ‘disposable’ clothing at low prices (JACOMETTI, 2019), that is, frequent purchases and the premature disposal of goods, which is encouraged by the overflow of new trends, perpetuating short products’ life cycles (ARMSTRONG; KANG; LANG, 2018). Figure 2, shows the discrepancy between the growth of clothing sales and the decrease in their utilisation, from 2000 to 2015.

Figure 2: Clothing sales vs. Clothing utilisation (2000-2015).

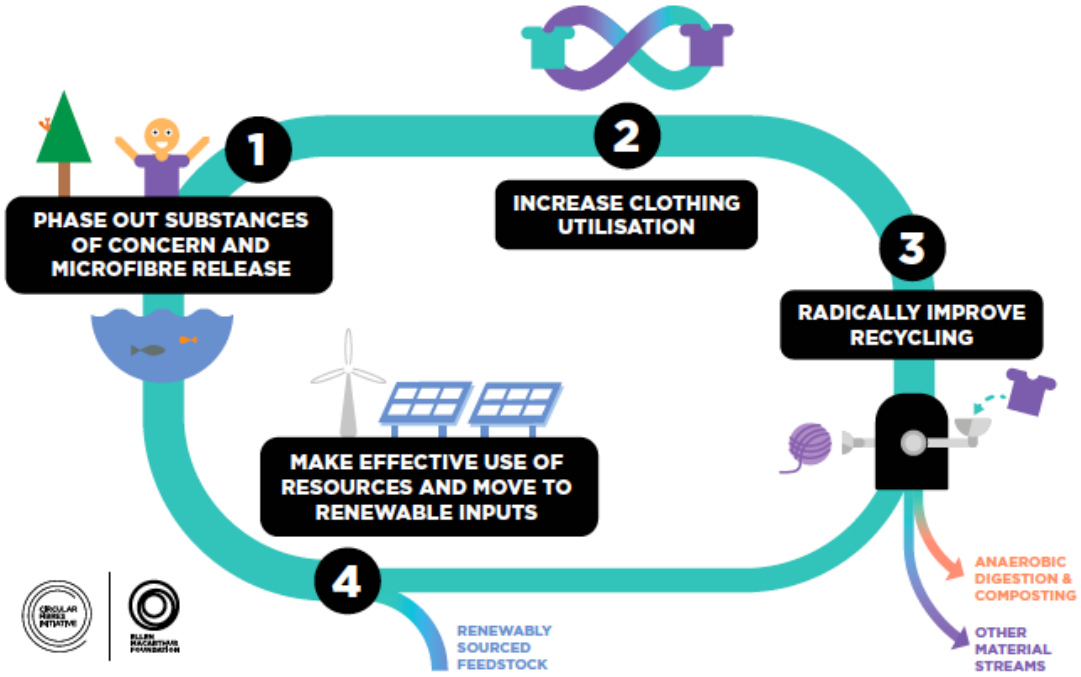


[1] *Average number of times a garment is worn before it ceases to be used*
Source: Ellen MacArthur Foundation (2017a).

These well-known, yet still, contemporary challenges encourage the textile and clothing industry to deliver better economic societal, and environmental outcomes, feasible through the transition towards the circular economy (CE) (MISHRA et al., 2021), which requires new ways of thinking and doing business (BOCKEN et al., 2016).

A New Textiles Economy, a report developed by the Ellen MacArthur Foundation (2017a), approaches how Circular Economy principles can lead to better outcomes in the textile and clothing industry. According to the report, this could be achieved by the implementation of four ambitions: (1) *Phase-out substances of concern and microfiber release*; (2) *Increase clothing utilization*; (3) *Radically improve recycling*; and, (4) *Make effective use of resources and move to renewable inputs* (Figure 3).

Figure 3: The transition to a new textiles economy.



Source: Ellen MacArthur Foundation (2017a).

However, it is unquestionable that this transition towards a circular economy in the textile industry demands a holistic change, involving complex factors. Innovative entrepreneurship, i.e., the creation of new products, services, production methods, or business models (BRADLEY et al., 2021), is critical for the circular economy's success.

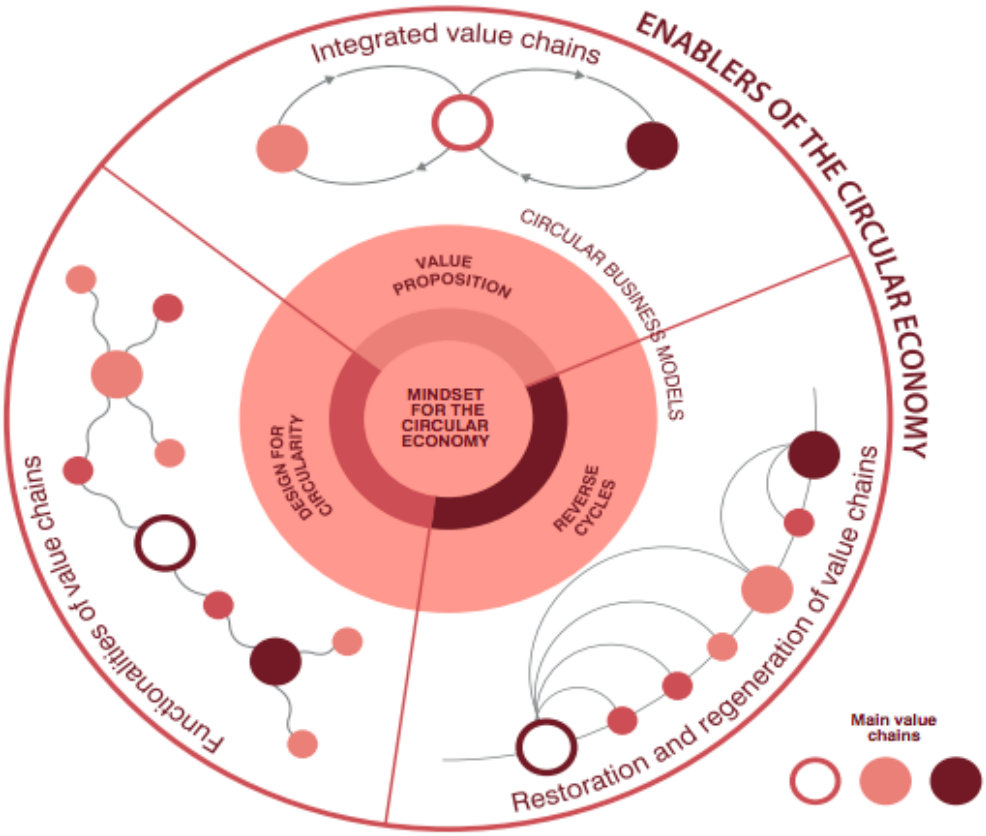
Furthermore, the transformation proposed by circular economy comprises commitment, collaboration, and innovation, from not only key industry and organisations players, but all stakeholders of the value chain, involved and affected by the sector, maximizing the initiatives' success (ELLEN MACARTHUR FOUNDATION, 2017a).

How value is perceived by people, especially consumers, needs to change (STAHEL, 2016). Particularly, consumers of the fashion industry have a huge impact on this sector, considering the massive negative impacts of the clothing use phase, the constant acquirement of new pieces and discard of garments, as well as high expectations on what they want to be delivered: convenience, quality, values orientation, newness, and price (MCKINSEY & COMPANY, 2017). Consequently, apparel consumers hold considerable influence when it comes to environmental health and resource consumption (ARMSTRONG; KANG; LANG, 2018).

A 2018 report on circular opportunities and challenges for the Brazilian industry (CNI, 2018) states that enablers must be created, developed and enhanced in order to

facilitate and upscale Circular Economy in the industry. Thus, the core of these enablers and, therefore, the essence of the discussion for a Circular Economy transition is a circular mindset (Figure 4).

Figure 4: Enablers of the circular business system.



Source: CNI (2018)

Mindsets can be defined as mental attitudes or pre-dispositions that an individual possesses to respond to specific situations. That is, they represent established behaviours and positioning from which individuals act and express themselves (DWECK, 2017). Circular mindset can guarantee, for example, the perception of value to be captured across a product chain (ZACHO; MOSGAARD, RIISGAARD, 2018) and even the involvement of consumers in sharing-based business models (BARBU *et al*., 2018).

Behavioural science, in terms of psychology and economics, plays a crucial role in determining and explaining consumer motivation and engagement (THE GREAT RECOVERY, 2018). And since environmental issues can be easily correlated to individual lifestyles, to promote changes concerning consumption behaviours it is of great importance that the factors involved in people's decision-making processes are understood (ONWEZEN; ANTONIDES; BARTELS, 2013).

1.2. Research rationale

The circular economy, as an attempt to balance environmental sustainability and the development of economic enterprises (MURRAY; SKENE; HAYNES, 2017), presents innovative circular business models (CBMs) that create, deliver, and capture value in closed material loops (MENTINK, 2014). Besides the development of technologies, products, and business models, Stahel (2016) highlights that the communication of strategies and raising awareness of manufacturers and the public are important allies of the realization of the circular economy. Communication and marketing activities are particularly relevant for transmitting information between companies and their consumers. Marking strategies, for instance, are designed to both inform and convince, eliciting emotive concerns that are more successful than factual communications (CHAMBERLIN; BOKS, 2018), and persuasive communication has been previously found to influence circular consumer behaviour and support the CE transition (MURANKO et al., 2018; MURANKO et al., 2019).

The fashion industry, due to being hugely globalized, contributes to negative environmental changes at a planetary scale, and part of its challenge is to recognize the dimension of its effects. Consequently, leading to rethinking the scope of the apparel industry's responsibilities and relationships, widening the focus of business activities (PALM et al., 2021). The transition to circular apparel industry, by tackling a grand challenge, requires a coordinated and sustained effort from multiple and diverse stakeholders, and comprises solutions that modify organizational routine practices and individual and societal behaviours (GEORGE et al., 2016).

Innovation brought by the circular economy, particularly CBMs, imply on mindset and behavioural changes from the consumers and users of circular products and services (QUINONES; AUGUSTINE, 2015). The acceptance of circular products has been indicated as a key barrier to be overcome by circular organizations (CAMACHO-OTERO et al., 2018), associating the success of CE initiatives with consumers' willingness to behave accordingly to the circular economy principles (DAAE et al, 2018).

Taking into account the importance of community engagement and consumers' driving force to promote change and magnify circular initiatives (GENG; SARKIS; BLEISCHWITZ, 2019), this research addresses apparel consumers' engagement towards circular initiatives, products and services. The aim of tise study is to develop a tool that builds up consumers' circular mindset in the apparel industry.

To address contemporary issues and challenges, which include individualistic reasoning, the science of human behaviour must be understood and applied, allowing society to change these ways of living through the transformation of people's personal and cultural behaviours (MOREIRA, 2013). Therefore, to support a circular consumer behaviour and mindset, the methodological approach consists of acknowledging psychological and contextual factors that guide consumers' behaviours.

Moreover, this research investigates the integration of three topics, the challenges concerning consumer acceptance, especially circular mindsets and behaviours, the circular business model innovation, and the communication and marketing efforts towards the circular economy, as they encompass important considerations for consumer engagement in circular consumption systems.

1.3. Hypotheses

To test the influence of psychological variables in apparel consumer behaviour the Value-Belief-Norm (VBN) theory (STERN, 2000), from the Environmental Psychology field of study, was used. This theory has been used to explain many pro-environmental behaviours focusing on normative considerations (SCHWARTZ, 1997; STERN et al., 1999; STERN, 2000). Specifically, it focuses on how values, via awareness of consequences, outcome efficacy, and personal norms, affect people's willingness to engage in pro-environmental behaviour, such as circular behaviour.

Hence, to test if the VBN theory can explain the willingness of apparel consumers to engage in the consumption of circular garments, the following hypotheses were proposed.

H1. Individuals that have strong materialistic values will show less intention to engage in behaviours that enhance circular fashion business models.

H2. The circular fashion consumption behaviour is influenced by the extent of a person's awareness of consequences, which is directly related to their feelings of outcome efficacy towards circular fashion products.

H3. Strong biospheric values influence people's awareness of consequence and outcome efficacy, resulting in stronger moral obligation (personal norms) to consume circular fashion products.

1.4. Research question

The challenges concerning the transition of the apparel industry to a circular economy are broad, especially if consumers are not engaged. Therefore, this research intends to answer the following question:

How can apparel retail companies promote consumer engagement in circular consumption systems?

1.5. Thesis structure

To answer this research question, the thesis was developed in an article format. Each paper presented represents a milestone of this research and is an input for the following papers. The first article maps the Brazilian apparel scenario, identifying the challenges and opportunities concerning the transition to a CE in the Brazilian apparel sector. This paper defined this thesis' main topic: consumer mindset and behaviour in the circular economy context. The next paper, presented at an international conference, presented the part of the methodological approach of this research and allowed the collection of insights from the scientific community. The third article investigated the role of mindsets and behaviours in circular consumption systems and identified the factors that influence them. In the fourth paper, the VBN theory's variables and model pointed out in the third paper as influencers on circular consumer behaviour were tested among Brazilian and Dutch apparel consumers. At last, the fifth article proposes a structure to guide and promote the engagement of apparel consumers towards circular offerings, gathering the results from the previous four papers and data collected from apparel companies.

This introduction section (1) is followed by the research's overall and specific goals (section 2). Then, the literature that supports this thesis is presented in section 3, followed by the methodological section (4). The results, in article format, are presented in section 5 and the research's overall conclusion in section 6.

2. Objective

2.1. Overall objective

This research aims to propose a structure that promotes consumer engagement in apparel retail companies through the integration of consumer behaviour for circular economy in the companies' long-term activities planning.

2.2. Specific Objectives

To achieve this objective, the following specific goals were defined considering the apparel industry:

- To identify diverse behaviours and mindsets addressed by circular business models;
- To investigate the reasons that guide favourable behaviours towards Circular Economy;
- To address similarities and differences of behavioural patterns in Brazil and the Netherlands in the endorsement and transition to a Circular Economy;
- To analyse the emergence processes of a circular mindset, regarding consumers' engagement in Circular Fashion;
- To develop the levels and elements of the proposed structure to boost the engagement of apparel consumers.

3. Literature Review

3.1. Key Concepts

3.1.1. Circular Economy

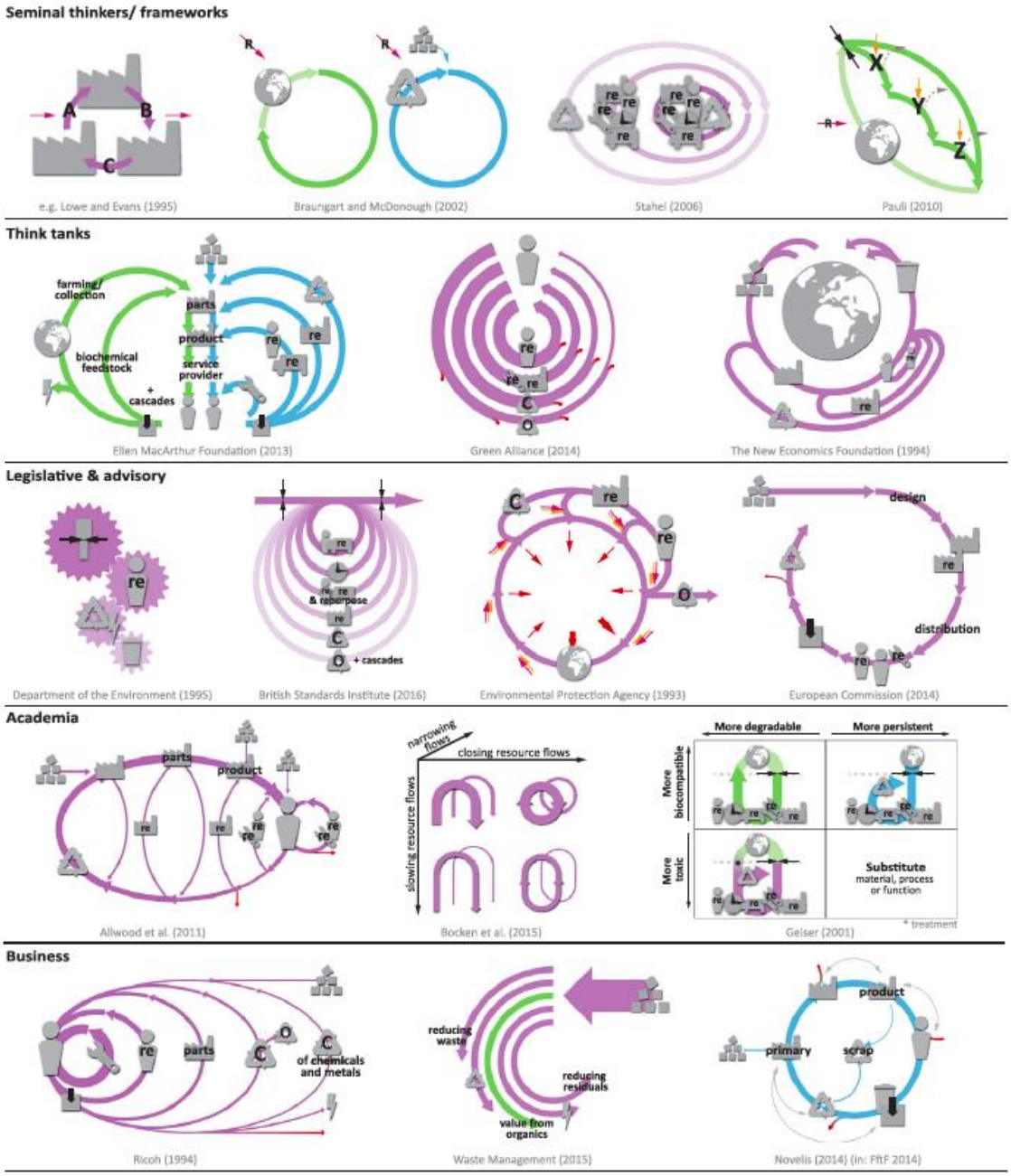
3.1.1.1. Origins, concepts, and definitions

According to Murray, Skene and Haynes (2017), Circular Economy (CE) is the most recent effort to implement strategies for sustainable development, integrating environmental wellbeing and economic activities.

In a 2016 study Ghisellini, Cialani and Ulgiati, tracked the idea of Circular Economy to the work of Pearce and Turner, from 1989. Based on the law of Energy and Matter Degradation (Thermodynamics), these authors advocate that circular systems patterns are essential to sustain human life. Additionally, Pearce and Turner (1989) also identified the General Systems Theory and Industrial Ecology as relevant roots of the CE due to, respectively, the complexity and interdependence of actors, such as organizations and the environment, and the promotion of closed flows of energy and materials.

Blomsma and Brennan (2017) characterise Circular Economy as an 'umbrella concept', that builds a connection between concepts that already exist but that were not previously related (Figure 5). Circular Economy theory can be linked to several authors and Schools of Thoughts: Biomimicry, Blue Economy, Cradle to Cradle, Industrial Ecology, Natural Capitalism, Performance Economy and Regenerative Design; and each one of these have significant contributions to every principle, approach and circular business model (ELLEN MACARTHUR FOUNDATION, 2017e).

Figure 5: Circular Economy as an Umbrella Concept.



Source: Blomsma and Brennan (2017).

Considering all the complexity and features associated to this theory, Prieto-Sandoval, Jaca and Ormazabal (2018) identified which elements are most used, and therefore essential, to formulate the concept of Circular Economy. They are:

- The recirculation of resources and energy, with the minimisation of resources demand and the recovery of value from waste;
- A multi-level approach;
- CE's importance as a path to achieve sustainable development; and,

- CE’s close relationship with how society innovates.

To enlighten the transdisciplinary approach towards Circular Economy’s conceptualization and its repercussion, Table 1 presents different definitions established in literature.

The most common approach when defining Circular Economy is its focus on material and resource flow and waste management, however, some few authors also highlight the importance of product design, generating positive impact to the environment (being restorative and regenerative) and to society.

Table 1: Circular Economy definitions established in literature.

Author and Year	Definition
Blomsma and Brennan (2017)	"An emergent framing around waste and resource management that aims to offer an alternative to prevalent linear take-make-dispose practices by promoting the notion of waste and resource cycling."
Ellen MacArthur Foundation (2017c)	"A framework for an economy that is restorative and regenerative by design."
Geng and Doberstein (2008)	The "realization of [a] closed loop material flow in the whole economic system."
Haas *et al.* (2015)	"The circular economy (CE) is a simple, but convincing, strategy, which aims at reducing both inputs of virgin materials and output of wastes by closing economic and ecological loops of resource flows."
Murray, Skene and Haynes (2017)	"An economic model wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being."
Park, Sarkis and Wu (2010)	"The CE policy seeks to integrate economic growth with environmental sustainability, with one element relying on new practices and technological developments, similar to the application of environmental modernization technology."
Prieto-Sandoval, Jaca and Ormazabal (2018)	"The circular economy is an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close energy and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels. Attaining this circular model requires cyclical and regenerative environmental innovations in the way society legislates, produces and consumes."
Webster (2015)	"A circular economy is one that is restorative by design, and which aims to keep products, components and materials at their highest utility and value, at all times."

Source: author.

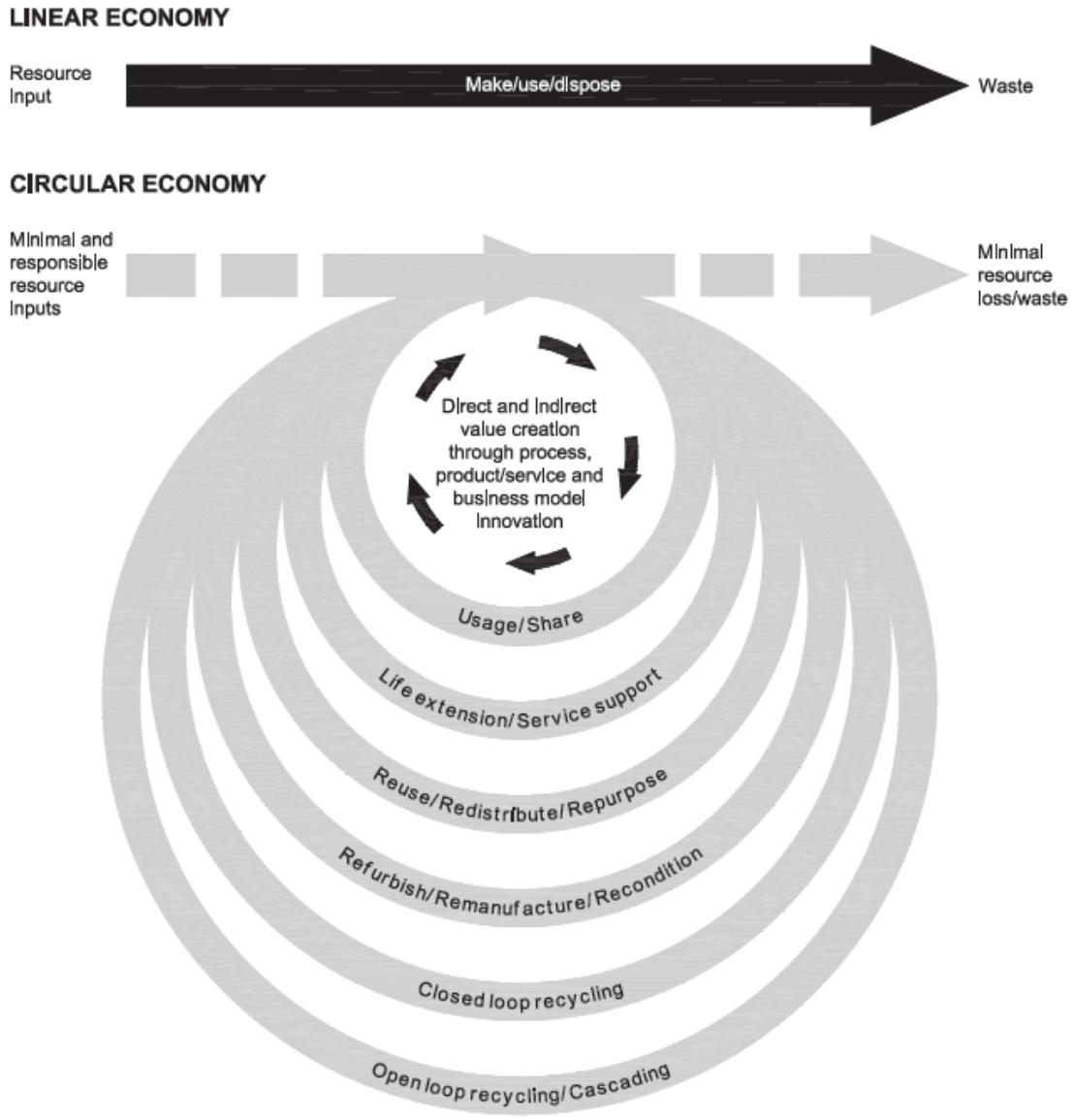
3.1.1.2. Features and Principles

Geissdoerfer *et al.* (2017) compare the concepts of 'Sustainability' and 'Circular Economy', both of which, besides being holistic, share interests in activities such as production and consumption, highlighting the importance of integrating social and environmental concerns with economic development. However, their motivations and goals are considered of different nature. Sustainability has diffused motivations, based on previous experiences, and its goals depend on the actors and scenario considered. On the other hand, Circular Economy aims to exclude the input and waste of resources, achieving a closed loop, and, therefore, is motivated by the idea that resources can be used more effectively than when employed in linear model systems.

Until recently, the linear pattern found in neoclassical economy dictated economic development. This pattern is based on the allocation of materials, energy and other resources according to market demands without taking into consideration the limits and exhaustibility of natural resources (GHISELLINI; CIALANI; ULGIATI, 2016). Murray, Skene and Haynes (2017) define it as 'converting natural resources into waste, via production' and Esposito, Tse and Soufani (2015) claim that this model of production threatens our future's stability.

In contrast to this, the CE model proposes nature-inspired cyclical processes. In these processes waste is designed out of the system and, natural and social capital are enhanced, disassociating the consumption of finite resources from economic activities (Figure 6). Therefore, Circular Economy focuses on benefiting society by redefining the concept of growth (ELLEN MACARTHUR FOUNDATION, 2017c).

Figure 6: Linear x Circular Economy.



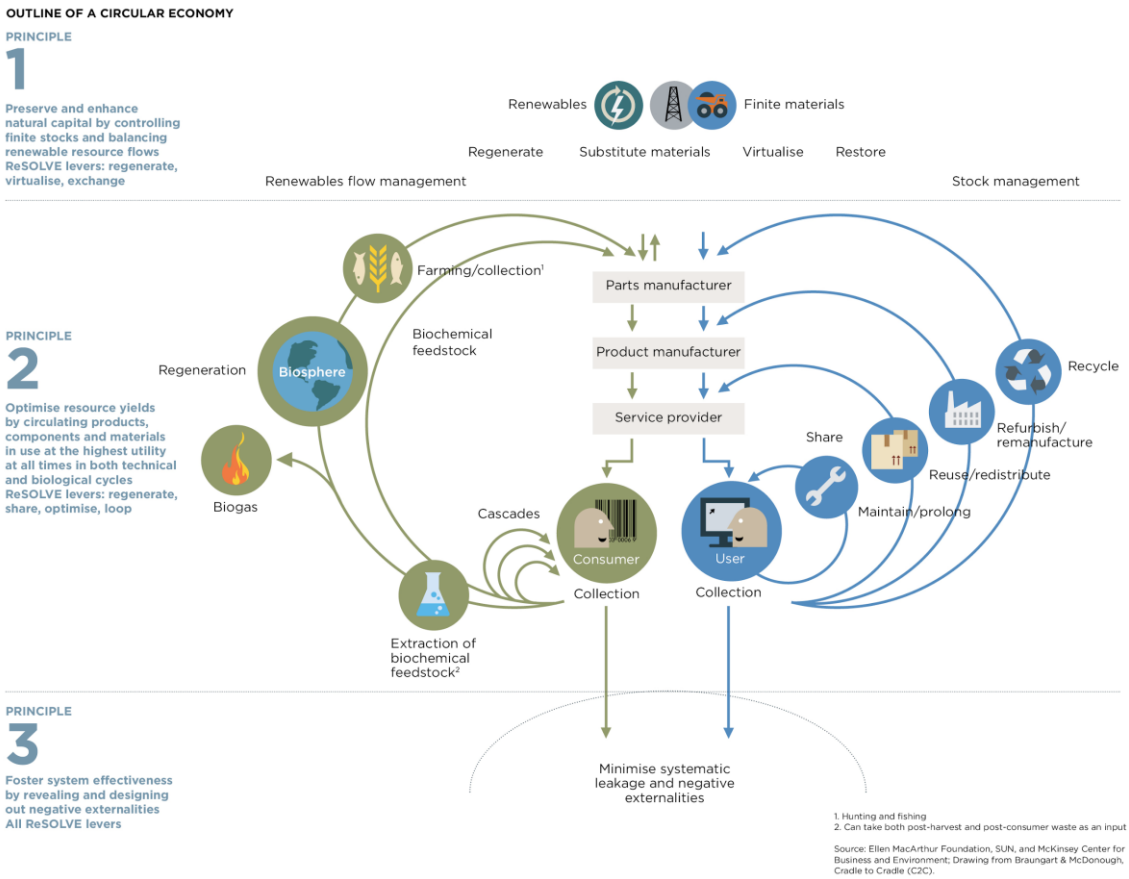
Source: BSI (2017).

According to Ritzén and Sandström (2017), Circular Economy's transition to new businesses models, product designs and high complexity material and energy use, involves balancing resources scarcity, environmental impact and, at the same time, promoting increased economic benefits.

Therefore, an important feature of processes entrenched in Circular Economy is their cyclical behaviour, enhancing rebuilt financial, human, or natural capital. These flows can be divided into two cycles (Figure 7): the biological one, where renewable resources are granted, biologically-based material may be consumed or fed back into the system, regenerating living systems; and the technical one, which supports strategies as reuse, repair,

remanufacture and recycling, responsible for recovering and restoring components and entire products (ELLEN MACARTHUR FOUNDATION, 2017c).

Figure 7: Outline of a Circular Economy.



Source: Ellen MacArthur Foundation (2017d).

Besides these characteristics, it is critical to understand which principles guide the Circular Economy, that is, what are the propositions that support this chain of reasoning.

During the literature review carried by Prieto-Sandoval, Jaca and Ormazabal (2018), the authors highlighted articles which divide Circular Economy principles into two groups: '3Rs' and 'Sustainable Design Strategies'. The first one is more common and refers to reducing, reusing, and recycling practices as a way to achieve 'low consumption, low emission and, high efficiency'. On the other hand, the second group is based on eco-design, nature-inspired and cradle-to-cradle strategies, which may involve designs with a more functional approach, as well as a more diverse set of solutions.

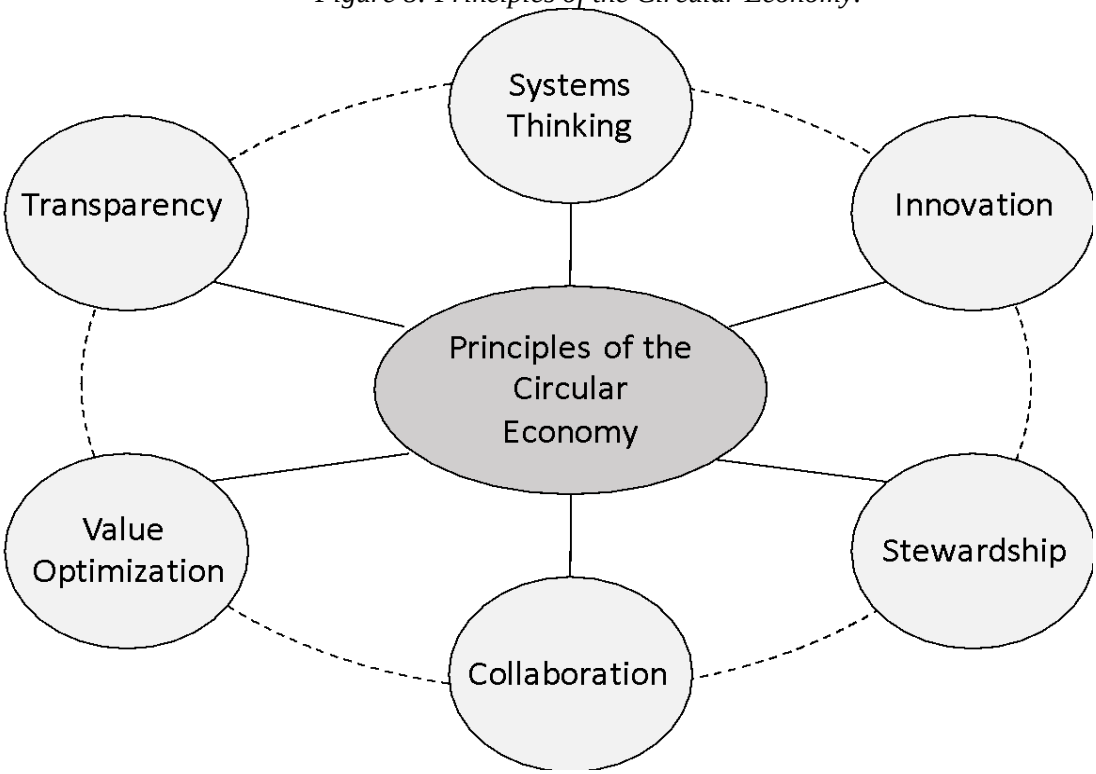
The Ellen MacArthur Foundation (2017c), for example, points out three principles which support the CE: (1) *Design out waste and pollution;* (2) *Keep products and materials in use*; and (3) *Regenerate natural systems*. A shift towards these principles must encompass both small as well as large-scale organisations, and impact individuals on a local and global level, generating business and economic opportunities.

Alternatively, the 3R's, reduce, reuse and recycle are also considered principles of Circular Economy, as pointed out by the work of Ghisellini, Cialani and Ulgiati (2016) and Haas *et al*. (2015). This is, however, a limited approach towards CE, focusing only on its resources and waste management principals, something that is criticised by scholars such as Esposito, Tse and Soufani (2015).

In addition, Naustdalslid (2014) points out that there is a huge gap between acknowledging the 3R's as integral parts of an economic-environmental system rather than just as elements in environmental policies, and highlight the importance of societal participation and stakeholder involvement to the flourishing of Circular Economy.

Considering this discussion, The British Standards Institution (BSI, 2017) presents a proper and suitable set of principles that encompasses the complexity of the Circular Economy concept (Figure 8).

Figure 8: Principles of the Circular Economy.



Source: Adapted from BSI (2017).

In total, there are six principles (Table 2), that, together, aim to create long-term business value, not only by managing resources but also products and services (BSI, 2017).

Table 2: BSI (2017) principles and definitions.

Principle	Definition
Systems Thinking	"Organizations take a holistic approach to understand how individual decisions and activities interact within the wider systems they are part of."
Innovation	"Organizations continually innovate to create value by enabling the sustainable management of resources through the design of processes, products/services, and business models."
Stewardship	"Organizations manage the direct and indirect impacts of their decisions and activities within the wider systems they are part of."
Collaboration	"Organizations collaborate internally and externally through formal and/or informal arrangements to create mutual value."
Value Optimization	"Organizations keep all products, components, and materials at their highest value and utility at all times."
Transparency	"Organizations are open about decisions and activities that affect their ability to transition to a more circular and sustainable mode of operation and are willing to communicate these in a clear, accurate, timely, honest and complete manner."

Source: author.

3.1.1.3. Limitations

When referring to Circular Economy, Murray, Skene and Haynes (2017) defend that the social dimension, in terms of human rights and wellbeing, is not accounted for as much as the economic and environmental dimensions. The benefits from closed loops and reduction of finite resources use are clear and relevant for humankind development and survival, however, the authors highlight that it is not evident how the CE will engage and lead the promotion of social equity, regarding gender, racial and other diversity aspects.

Nevertheless, Ghisellini, Cialani and Ulgiati (2016) support that Circular Economy, through its proposition of low or no material, energy, and environmental costs, can implement new patterns which can enable society to attain wellbeing.

On another note, authors like Lemille (2017) assert that Circular Economy has the same 'narrow-minded corporate objective' as its predecessor (the linear model) and focuses primarily on profit maximization. The author points out two dimensions that are missing in the CE design: the optimization of human resources and power distribution. In his work, Lemille affirms that by engaging these other dimensions it would be possible to achieve 'Circular Economy 2.0', which aims to redefine the concept of economic growth, but also to end poverty. According to the author, it is not possible to disassociate economic, environmental and social issues and, if there is a chance to redesign the Economy, then all these three aspects must be addressed.

3.1.1.4. Obstacles

Perceiving that Circular Economy is very much theorised but rarely implemented, Ritzén and Sandström (2017) focused on identifying the model's main barriers, them being: (1) *Financial*, as in profitability and defining indicators that measure the economic benefits, (2) *Structural*, for both distribution responsibility and information exchange; (3) *Operational*, regarding the infrastructure and supply chain management; (4) *Attitudinal*, that is, how sustainability is perceived and risk avoided; and (5) *Technological*, concerning the interaction between production processes and product design.

Jesus and Mendonça (2018) also identified barriers to a Circular Economy, however, the authors divided them into two categories: 'hard', related to techno-economic elements, and 'soft', concerning cultural issues and regulation (Table 3).

Table 3: Barriers to a Circular Economy.

Categories	Groups	Barriers
"Harder" factors	**Technical**	Inadequate technology, lag between design and diffusion, lack of technical support and training
	Economic/ Financial/ Market	Large capital requirements, significant transaction costs, high initial costs, asymmetric information, uncertain return and profit
"Softer" factors	**Institutional/ Regulatory**	Misaligned incentives, lacking a conducive legal system, deficient institutional framework
	Social/ Cultural	Rigid consumer behaviour and business routines

Source: Adapted from Jesus and Mendonça (2018).

3.1.1.5. Opportunities and Levers

The shift towards a Circular Economy is embedded in change, being disruptive and, therefore, requiring new attempts and solutions to problems that are well known or new to an organisation and their stakeholders, challenging their capability to manage innovation (RITZÉN; SANDSTRÖM, 2017).

Through empirical studies, the Ellen MacArthur Foundation (2017b) identified four building blocks, that is, the bases for a transition to a CE. They are: (1) *Reverse cycles*, by the cascading of processes and the return of material to biological or technical cycles; *(2) Circular Economy Design*, which uses skills and competencies to promote cascading, recycling and product reuse; *(3) New Business Models*, that seek new opportunities and ways to monetise initiatives; and *(4) Enablers and favourable system conditions*, which must be identified and explored, such as collaboration, suitable environmental legislation and access to financing.

Governments are important actors in the implementation of Circular Economy and their contribution may boost the model's development by encouraging research programmes, providing financial incentives and integrating circularity in public policies (TEN WOLDE, 2016).

In their work, Esposito, Tse and Soufani (2015) mention some examples of levers used by policymakers to encourage and push for change in the Legislation towards a Circular Economy. Policies such as producer responsibility laws, taxing resource consumption, enabling the shift to renewable energy systems, and stimulating urban planning efficiency, demonstrate both the influence and power policymakers must regulate and support Circular Economy systems and their performance.

However, several attempts to build momentum and change efforts towards sustainable development, as done by UN conferences, evidenced that without the willing participation of organisations and, moreover, global corporations, governments are not capable of instigating this transition. Therefore, it is crucial to identify opportunities, such as new strategies and circular business models, to enable and boost the shift towards a Circular Economy (MURRAY; SKENE; HAYNES, 2017).

A Business Model (BM) is defined by Richardson (2008) as the conceptual and architectural implementation of a business strategy and the foundation for the implementation of business processes. According to the author, BM includes capabilities, sources of revenue, value proposition, networks, and stakeholders, means of delivering

services and products, among other components. That is, a business model outlines how an organisation operates its enterprise, creating, delivering, and capturing value (OSTERWALDER; PIGNEUR, 2010).

A circular business model, consequently, is 'the rationale of how an organisation creates, delivers and captures value with and within closed material loops' (MENTINK, 2014). This definition can be complemented by Linder and Williander's (2017) notion of it as process 'in which the conceptual logic for value creation is based on utilizing economic value retained in products after use in the production of new offerings.

A comparison between what was disseminated as traditional (linear) and the circular BM can be found in Table 4, regarding their Value Proposition (What), Activities, Processes, Resources, and Capabilities (How), Revenue Models (Why) and Customer Interfaces (Who).

Table 4: General characteristics of linear and circular BM.

BM pillar	Traditional/Linear BM Selling products	Circular BM Providing services
What?	Products	Services
	Cheap, quick, easy, dump	Cheap, quick, easy, reuse or recycle
	Volume-based	Performance-based
How?	Take, make, waste	Take, make, remake
	KPIs on the production of units (make more = sell more; volume based)	KPIs on performance and service efficiency
	Limited role and influence of customer	Customers become partners
	End-of-pipe waste treatment solutions	Setup reverse logistics
	Supply chain management several tiers up (and maybe down)	Supply chain management of the whole system
Why?	Pay per product	Pay per use or performance
	Make more = sell more Negative value creation at some stages (waste) Responsibility stops after point of sale	Make better = sell/gain more Positive value creation at all stages needed Shared responsibility throughout the chain
Who?	Transfer ownership	Access over ownership
	Products aren't taken back	Product took back or service/performance provision
	One size fits all	More intense customer relationship

Source: Mentink (2014)

The BSI (2017) states that circular economic systems are consistent with six groups of business models: (1) on-demand; (2) dematerialization; (3) product life cycle extension/reuse; (4) recovery of secondary raw materials/by-products; (5) product as a service/product–service system (PSS); and (6) sharing economy and collaborative consumption. In addition to this categorisation, Lacy and Rutqvest (2015) indicate five circular business models, three of which are compatible with the BSI groups 3, 5 and 6, therefore, presenting two new groups: business model based on the circular supply chain where renewable, recyclable or biodegradable resources are put into the chain; and business model based on recovery and recycling where companies recover products at the end of life, reuse materials and components, recover waste and by-products from a productive process.

These business models promoted by the Circular Economy present solutions to several negative environmental impacts, nonetheless, they, especially for those based on sharing initiatives, imply on behavioural changes from the consumers/users of products and services negotiated in the form of this economic model (QUINONES; AUGUSTINE, 2015). The mindset change involved in this transition, such as valuing access and use in opposition to ownership of a product, stimulates the growth of the Circular Economy, and can be encouraged by organisations and circular initiatives, contributing to an increase in satisfaction, trust and support from their clients (BARBU *et al*., 2018).

3.1.2. Environmental Psychology

The interest and research on the interaction between human behaviour and the natural environment date from the beginning of the 1970's and is called Environmental Psychology (STOKOLS, 1978).

Canter and Craik (1981) define environmental psychology as: 'the area of psychology which brings into conjunction and analyses the transactions and interrelationships of human experiences and actions with pertinent aspects of the socio-physical surroundings.

The main goal of this area of study is to understand what dictates people's activities regarding environmentally relevant domains (KLÖCKNER; BLÖBAUM, 2010), through the analysis of environmental behaviour, that is, behaviours that modify the availability of resources and energy and change the structure and dynamics of ecosystems or the biosphere (STERN, 2000). Environmental psychology offers strategies for the development of solutions relative to social issues concerning the natural environment (STOKOLS, 1978).

Furthermore, although this field is undoubtedly an area within the field of Psychology, the transdisciplinary essence of the problems studied demand experts, methods, and concepts from multiple disciplines (CANTER; CRAIK, 1981).

Many studies have been developed in the last few years involving environmentally relevant and urgent matters, such as energy (PICHERT; KATSIKOPOULOS, 2008), mobility (HUNECKE *et al*., 2007), and climate change (VAN LANGE; JOIIREMAN; MILINSKI, 2018).

3.1.2.1. Theories, models, and concepts

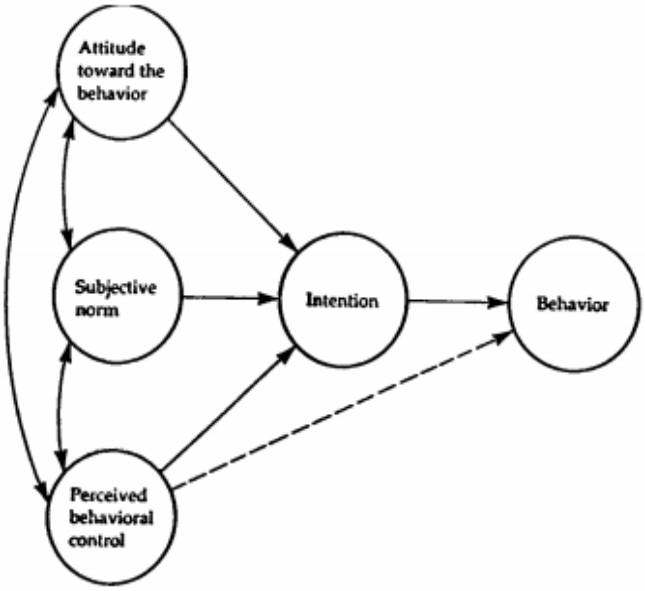
There are several models and approaches developed by the field of environmental psychology. The main ones and most commonly used in this domain are: Theory of Planned Behaviour (TPB, Ajzen, 1991), the Norm-Activation-Model (NAM, Schwartz and Howard, 1981), and the Value-Belief-Norm Theory (VBN, Stern, 1999) (KLÖCKNER, 2013).

These theories are described below.

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour was postulated in order to explain and predict behaviour in specific contexts, using an individual's intention to perform this given behaviour as a central factor (Figure 9) (AJZEN, 1991).

Figure 9: Theory of Planned Behaviour.



Source: Ajzen (1991)

According to Ajzen (1991), intention measures the planned effort and wiliness to try to perform a behaviour, capturing motivational factors that influence it. These factors may be:

- Attitude towards the behaviour – the degree to which an individual has an unfavourable or favourable appraisal of the behaviour in question;
- Subjective norm – perceived social pressure to perform, or not perform, the behaviour (social norms);
- Perceived behavioural control – perceived ease or difficulty of performing the behaviour and anticipated impediments and obstacles.

Additionally, human behaviour can be influenced by: Behavioural beliefs, the strength of this belief is directly proportional to the value attributed to its correspondent attitude; Normative beliefs, the likelihood that important referent individuals or groups approve or disapprove of performing a given behaviour; and, Control beliefs, that deals with the presence or absence of requisite resources and opportunities (AJZEN, 1991).

In certain contexts, other factors should be taken into consideration when analysing behaviour, such as non-motivational factors (E.g.: skills, time and money), that can, to some degree, determine the performance of some behaviours; and, feelings of moral obligation or responsibility to perform, or refuse to perform, a certain behaviour (personal norms) (AJZEN, 1991).

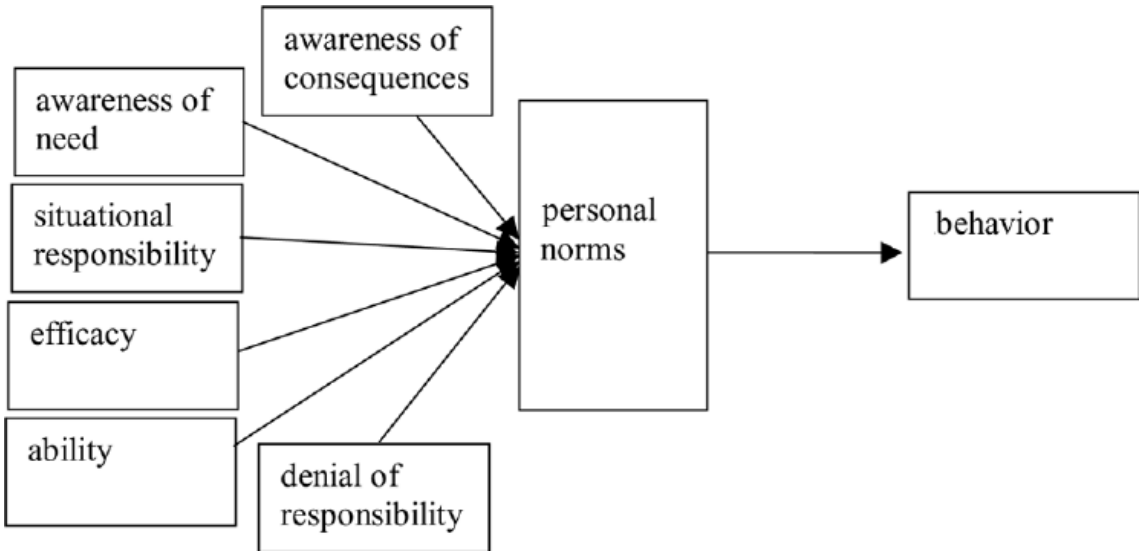
That being said, the prediction of behaviours is possible to be achieved by following certain conditions: (1) *be context specific*, that is, measures of intention and of perceived behavioural control must correspond to or be compatible with the behavior that is to be predicted; (2) *stability*, during the interval of observation and evaluation of the behaviour, intentions and perceived behaviour control must not vary; and, (3*) accuracy* (AJZEN, 1991).

Therefore, to sum up, the Theory of Planned Behaviour states that intentions are dictated by attitudes, subjective norms and perceived behavioural control; while behaviour is determined by intentions and perceived behavioural control.

Norm-Activation Model (NAM)

The Norm Activation Model explains altruistic and environmentally friendly behaviour (ONWEZEN; ANTONIDES; BARTELS, 2013) and uses personal norms are the core feature of the model (Figure 10) (SCHWARTZ; HOWARD, 1981).

Figure 10: Norm Activation Model.



Source: Schwartz and Howard (1981)

Norms are described as shared beliefs on how one should act, enforced by the expectations of rewards or the threat of punishments; while personal norms, in turn, can be defined as self-expectations, in a specific situation, of a particular action, that can be experienced both as a feeling or a moral obligation (SCHWARTZ; HOWARD, 1981).

The NAM states that social pressure can be less relevant in environmentally responsible behaviour, that is, these behaviours are grounded in the strength of personal norms (ONWEZEN; ANTONIDES; BARTELS, 2013).

Personal norms, therefore, can be used to predict individual behaviour, and are determined by two factors (SCHWARTZ, 1977):

- The awareness that there are consequences to performing, or not performing, a particular behaviour; and,
- The feeling of responsibility for performing this specific behaviour.

Thus, individual behaviour is induced by personal norms, which can only be activated by feelings of responsibility towards the behaviour, that, in their case, is the result of the awareness of the consequences of this given behaviour (de GROOT; STEG, 2009).

Additionally, studies concerning the NAM often include anticipated emotions, such as pride and guilt, that arose after one's self-evaluation when following, or failing to follow, personal or social standards, which is particularly relevant in understanding pro-

environmental behaviour within the Norm-Activation Model (ONWEZEN; ANTONIDES; BARTELS, 2013).

Furthermore, Onwezen, Antonides and Bartels (2013) also suggest that an integration between TPB and NAM can better explain pro-environmental behaviour, since intentions mediate the influence of personal norms on behaviour.

Value-Belief-Norm Theory (VBN)

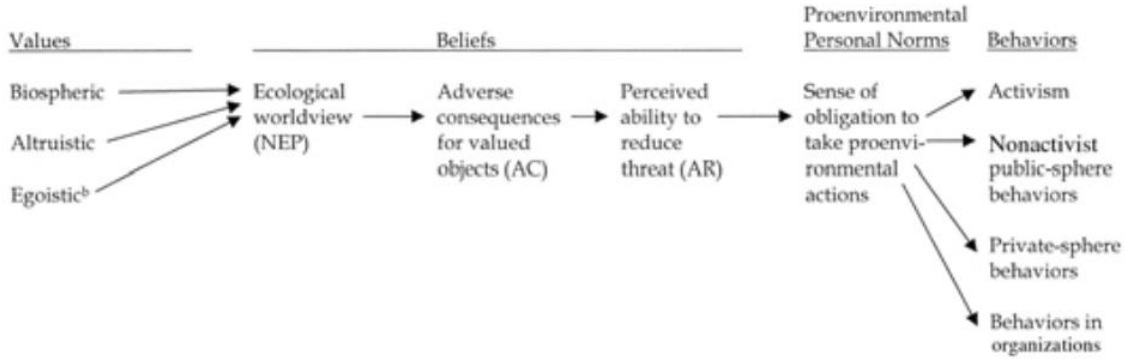
Stern and colleagues (1999) studied how the Value-Belief-Norm theory support environmental movements, that being, how to engage individuals in pro-environmental actions and influence the behaviour change of the policy system and the broader population. According to the authors, this support is provided by a sense of obligation (personal norm) towards a value that people believe is threatened.

Therefore, there are three important factors concerning the VBN Theory (STERN *et al.*, 1999):

- Acceptance of particular personal values;
- Beliefs that things important to those values are under threat; and,
- Actions initiated by the individual, as a result of a sense of obligation, in order to help alleviate the threat and restore the values.

Figure 11 illustrates the variables incorporated by the Value-Belief-Norm theory, in which each variable of the chain directly affects the next, but also can affect variables further down the chain (STERN, 2000).

Figure 11: Value-Belief-Norm Theory.



Source: Stern (2000).

Personal values such as altruistic and biospheric or egoistic and materialistic can or not activate a new ecological paradigm (NEP), that is, a pro-environment worldview. The

NEP results in individuals who believe that particular conditions pose threats to others. They achieve awareness of adverse consequences (AC), and of the fact that their actions could avert those consequences, attributing responsibility to themselves (AR), and culminating in moral obligations (personal norms), increasing pro environmental behaviours (STERN, 2000).

It is also important to emphasize that, as personal norms are determined by beliefs of the threat to valuable matters and by the personal competency to avoid that, these beliefs are influenced and shaped by the available information (STERN, 2000).

Moreover, Stern (2000) states that besides attitudinal factors (norms, beliefs and values), behaviours can be influenced by contextual forces (availability, government regulations, monetary incentives, etc.), individual capabilities (knowledge and skills), and, habit and routine, which may represent obstacles for behaviour change.

3.2. Application Field

Mankind expressed its need for cloth warmth, wind, and waterproofness since the Stone Age when fur provided the first garment ever used by humans, signifying a higher survival expectancy. At this stage the preparation methods for the rough material, e.g. skins, were still precarious, but, with the advance of new techniques and the emergence of other textiles in the Bronze Age, sewing methods were developed and enhanced, and by the Iron Age men and women had a multiplicity of clothing pieces (NATIONALMUSSET, 2018).

Thus, apparel production is an older activity than the manipulation of metals and even agriculture. Meaning it is human's kind first and most enduring, form of technology, and probably one of the most ancient currencies, used for several transaction trades (BARBER, 1993).

The evolution of textile manufacturing from a self-sufficient phase to its first industrialized stage is marked by the first small-scale industry, which relied primarily on cotton, but also wool and flax (TEXTILE SCHOOL, 2018). According to Miller (1965), the history of cloth production at scale started in the twelfth century, suffering a significant increase of demand and manufacturing in the fourteenth century, leading up to the beginning of an industrialized society by the fifteenth century, with the invention of the spinning wheel and handlooms.

The textile industry marked the Industrial Revolution and allowed for the development of several countries, such as the UK, Japan, Germany, and the USA. And keep

doing so in great parts of Asia, such as Singapore, Indonesia, Taiwan, and Vietnam (BRENTON; HOPPE, 2007).

Currently, the textile industry is a hugely globalised industry, as its market is primarily international and based on the export and import of commodities and products, as a buyer-driven chain. It is also characterized by a disjointed pattern, distinguished by diverse channels, such as giant cost-driven discount chains, upscale branded marketers, apparel speciality stores, among others. Likewise, the production processes are dismembered and is commonly structured by the assembly of different pieces, produced by distinct companies (GEREFFI, 1999).

This dispersed production system contributes to the corporate interest of reducing costs by since it allows outsourcing (cheap workforce), with multinational organisations relocating their capital to decrease production costs. As a result, social issues are made apparent, such as unfit work conditions and intensified market competition among national and smaller producers (GIRNEATA, 2015).

Accordingly, huge transformations occurred in the business environment of the fashion apparel industry since the 1990s, changing the market dynamics and demands. These changes include speed of production, increased the number of fashion seasons, flexibility of design and quality, and rapid responsiveness, mainly due to a closer relationship between actors of the supply chain, such as suppliers and consumers. In this scenario, companies in the industry are compelled to quickly grant the newest trends, originating what is called ‘Fast Fashion’ (BHARDWAJ; FAIRHURST, 2010).

Christopher, Lowson and Peck (2004) argue that this emergence of quick response made it improbable to predict fashion demand, and the industry must be able to develop strategies to create, manufacture and deliver products based on a ‘real-time’ demand.

3.2.1. Self-expression and Collective Acceptance

The relationship between consumers and clothes in an individual and, therefore, a context-driven approach is described by Banister and Hogg (2004) as the ideas of self-concept, self-esteem, and self-consistency. According to the authors, a person is motivated by their self-esteem to engage in behaviours that protect his or her sense of self-concept, which includes the acceptance or rejection of certain products or brands, for example. Moreover, to be self-consistent is to behave typically to a person’s perception of self, that is also strongly associated with what they wear.

Additionally, goods that have symbolic meanings, such as apparels, are used to, other than cultivate, preserve and express identity, connect with society, showing their affiliation, or lack of it, with certain social groups, and to seek for collective acceptance (PIACENTINI; MAILER, 2006).

Piacentini and Mailer (2006) concluded in their research that the consumption of wearable goods has a more significant effect upon the self, compared to the consumption of other products, emphasizing that the use of certain clothes may induce psychological effects that reduce insecurities and motivate individuals to feel more confident and prepared to fulfil a particular role.

The public makes choices and acquires clothes, and will keep doing so based on how they look and feel, and what they want to express (SAITO, 2018), thus the importance of guaranteeing aesthetic and style features in sustainable and circular products.

3.2.2. Consumerism

Evidence that consumers, in addition to being demanding, present distinct patterns and behaviours resulted in a rising importance of fast fashion. While consumers born before 2000 century have a preference in buying fewer clothes, of higher quality, millennials favour acquiring low-priced and low-quality pieces, to make for a larger wardrobe. Therefore, these consumers shop more often and require multiple options, which makes fast fashion a consumer-driven approach (BHARDWAJ; FAIRHURST, 2010).

Having said that, new fast-fashion trends and, consequently, the transition towards low-grade products lead to a throwaway culture, in which individuals perceive clothes as disposable goods (CHAPMAN, 2009).

Overall, the apparel industry clearly illustrates the conflict between aesthetics and environmental concerns by, on one hand, creating demand and social pressure to always be up to date, at the same time as its products become stylish-obsolete in a short period of time, enhancing the ‘frenzy of purchasing new products’ (SAITO, 2018).

From 2000 to 2015, this enhanced consumption and throwaway pattern were quantified, showing that the number of clothes sold across the world, almost doubled, whereas their utilisation decreased by 17.5%, during the same period. These figures display how the textile industry operates in a linear way: clothes are usually used few times and disposed of, resulting in a huge amount of lost material left for landfill or incineration (ELLEN MACARTHUR FOUNDATION, 2017a).

3.2.3. Social and Environmental Issues

The textile industry is known for being one of the most polluting industries in the world. Moreover, it has been gaining attention, particularly after the collapse of Rana Plaza (Bangladesh, 2013) in which more than 1,000 workers were killed as an industry that shows contempt for work conditions and human rights (AUSTGULEN, 2016).

According to Saito (2018), these nine factors, currently incorporated in the textile industry, are the main components of social and environmental impacts:

- Use of resources to produce yarns, fabrics, and other materials;
- Energy, water and other substances used during the manufacturing process;
- Toxicity of dyes and finishes;
- Fabric waste generated during the manufacturing process;
- Use of resources for packaging and transportation;
- Use of resources, such as water, electricity, detergents, and even toxic elements (e.g.: chlorine bleach) for the textile's care;
- Landfills, and their expansion, used to dump and disposal textiles;
- Health effects on workers and consumers due to toxic dyes and finishes;
- Violation of factory workers' human rights.

Therefore, to consider apparel as passive goods, that is, perishable materials is to support unsustainable consumption patterns (VALLE NORONHA; WILDE, 2018). Common Objective (2018) recognises and supports initiatives that intend to change this paradigm, and elected 10 criteria for ethical fashion: (1) counteracting fast fashion and its damaging impact; (2) promoting fair wages, working conditions and worker's rights; (3) ensuring sustainable livelihoods; (4) avoiding harmful substances, such as toxic pesticide; (5) using eco-friendly material; (6) reducing water usage; (7) recycling and incorporating energy efficiency; (8) supporting sustainable standards for fashion; (9) raising awareness on ethical behaviour; and (10) promoting animal rights.

3.2.4. Brazilian Context

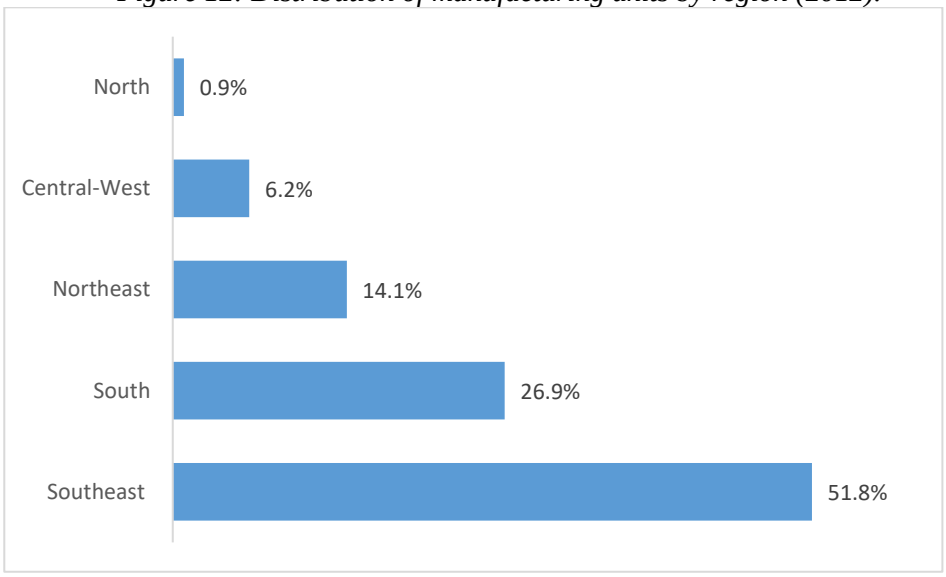
In Brazil, the Textile Industry dates back about 200 years, although, some historians believe that cotton was woven by natives before the arrival of the Portuguese. During colonial times, the industry and commerce were not promoted within the territory, being that colonisers prioritised the exploitation of raw materials. This began to change at the end of

19th century, when the ports were opened, creating an external market demand, with customs duty begin collected, stimulating several textile factories to be built in the country, mainly in the States of Bahia, Minas Gerais, Sao Paulo and Rio de Janeiro (FUJITA; JORENTE, 2015).

The Brazilian Textile Industry is currently, the most complete textile value chain in the western hemisphere (ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO, 2017). It promotes the exploitation of biological materials, such as protein-based (leather, silk, wool, etc.) and cellulose-based (cotton, linen, jute, etc.), and synthetic materials, plastic or non-plastic (SANTANA; WANDERLEY, 1998). Not to mention the country also holds place to several related activities, such as yarn and fabric production, finishings, assembly, retail, wholesale, services, post-use, and reverse cycle. And to complete the list, Brazil holds one of the most important markets for the industry (ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO, 2017).

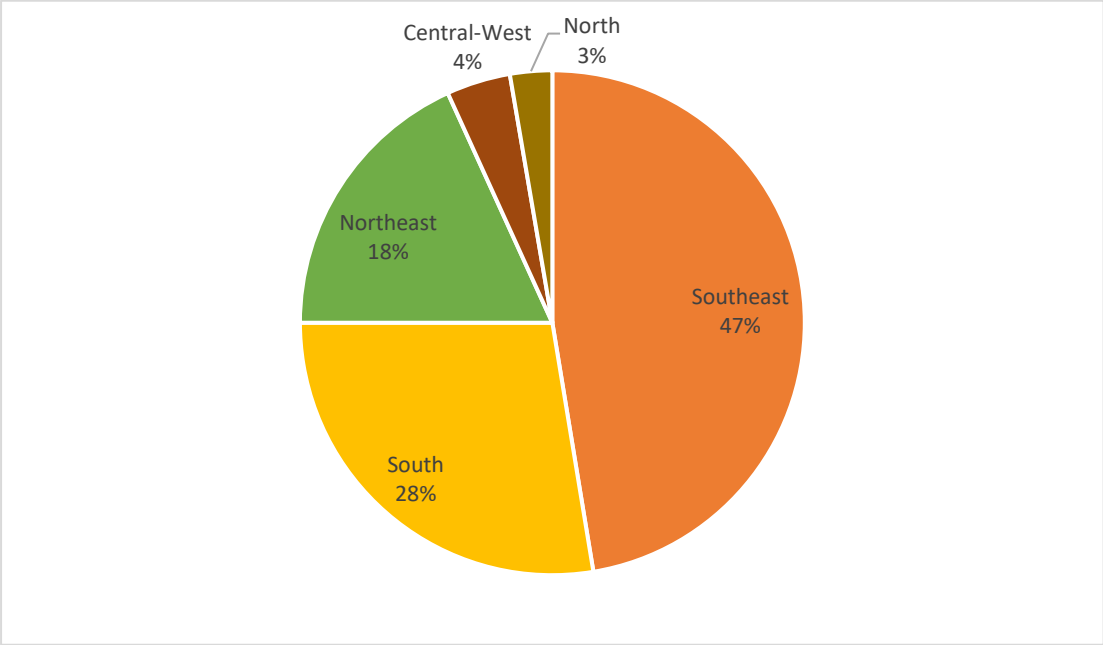
The data illustrated in the Figure 12 and Figure 13 show that the greater portion of the Brazilian textile production and profit is clustered within two geographic regions, Southeast and South.

Figure 12: Distribution of manufacturing units by region (2012).



Source: Adapted from SEBRAE/BA (2017)

Figure 13: Distribution of production value by region (2012).



Source: Adapted from SEBRAE/BA (2017)

In 2017 there were 27.5 thousand formal textile companies in the country, which produced circa 1.3 million tonnes or 8.9 billion pieces and invoiced 51.58 billion dollars. This industry houses 1.5 million direct employees and 8 million indirect employees, and the Brazilian Fashion Week is one of the most important Fashion Weeks in the world (ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO, 2017).

It can be said that Brazil's market differentiation relies on trends that utilise and emphasise local designs, in terms of culture and national identity (*Brazilianity*), and boosts the value captured by national producers with the "Made in Brazil" branding (FUJITA; JORENTE, 2015).

Although there are some cases of national businesses, along with foreign players, that distinguish themselves from the fast fashion movement (AHLMA, 2018; REVOADA, 2018), the overall regime of the fashion businesses in Brazil is still dictated by the fundamentals of scale and price rather than quality and value (ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO, 2018; SEBRAE/BA, 2017).

In addition, the industry still has some challenges to overtake, such as work informality and employment vulnerability that takes place in a great part of the Brazilian textile value chain. This scenario intensifies labour exploitation and weakens legal employers' responsibility (CABREIRA; WOLFF, 2012). In order to escape their precarious social conditions (unemployment, lack of formal education, sexism, among others) these

workers, in their majority women, submit themselves to low wages and less than adequate work conditions, for they do not know their rights, nor realise the absence of them as employees (TRINDADE, 2016).

Furthermore, the connections in the value chain are still weak, particularly for small and medium enterprises (SMEs), which invariably cannot bypass some large players to make their products known. The pursue of an economy of scale and specialisation contributes to a reduction of integration between enterprises and the industrial structure, as a whole (KON; COAN, 2005).

Regarding the infrastructure agenda, there are issues like expensive and inefficient outflow of products and lack of energy security. Therefore, the target of public and private initiatives is still to obtain basic operation conditions (ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO, 2014). On the other hand, some work has been done to integrate the physical and virtual infrastructure in the country, in order to capture more value, achieve other markets, grasp niches, and attain a circular conception of products and services (AGÊNCIA BRASILEIRA DE DESENVOLVIMENTO INDUSTRIAL, 2010).

As an example, the rental service is emerging as an innovative business model and was pointed out by the World Economic Forum (2018) as the future of fashion. Clothes leasing results in a longer product and service life, as well as reduces material use and pollutant emissions. This model relies on technological advancements, such as integrating physical and virtual infrastructure, and has already been made available in the State of São Paulo with organisations like BLIMO, House of Bubbles and Roupateca.

Concerning other technological and innovative movements, the Brazilian textile industry is investing in the innovation of threads, with the use of new materials (such as biodegradable ones), as well as reducing fabric waste (CNI, 2018). Sustainability and solutions with low or zero environmental impact are also trends that articulate the Brazilian textile industry with Circular Economy, focusing on areas like machinery, energy and production processes (FCEM, 2018).

However, according to the last research on the habits of Brazilian apparel consumers (MDIC, 2011), in 2010, it was possible to identify inclinations that do not follow these trends. From the total questioned almost half of them (48%) declared they buy new garments every month or less. Moreover, 35% of the consumers admit they do not plan their purchases and 36% of all interviewed acknowledge that their acquisitions are not driven by the needs, rather than by impulse. Therefore, to achieve a circular textile and apparel industry in Brazil, it is

necessary to engage its consumers as well, since there is still a predominance of old habits (linear model).

3.2.5. Dutch Context

The Netherlands is not a country with a large tradition in the fashion industry, however, it's recent productions have had remarkable success, such as the affordable retailer *C&A*, the popular jeans brand *C-Star*, as well as the exclusive and conceptual designs by *Viktor&Rolf* (SMELIK, 2017).

However, despite the country not having an iconic fashion heritage, the Netherlands has a diverse set of costumes, from fishermen garments to folklore clogs, which were encouraged during the nineteenth century. This was an attempt to avoid modernisation and to boost the idea of unity, also enabling the Dutch population collaborated to provide enough clothing for the community (TEUNISSEN, 2017).

Until the 1970s it was common for many Dutch families to have their clothes made by seamstress, however, in the 1980s, with the launch of big chain stores in the Netherlands such as *Gap* and *Banana Republic*, a larger portion of the population began to acquire ready-to-wear fashion, which became even more popular during the 1990's, when these fast-fashion brands started marketing teenage consumers (TEUNISSEN; VAN ZIJVERDEN, 2016).

By the same time, in 1988, the Dutch government started supporting national fashion by enabling designers to receive grants, and, consequently, being showed and recognised internationally (TEUNISSEN, 2017).

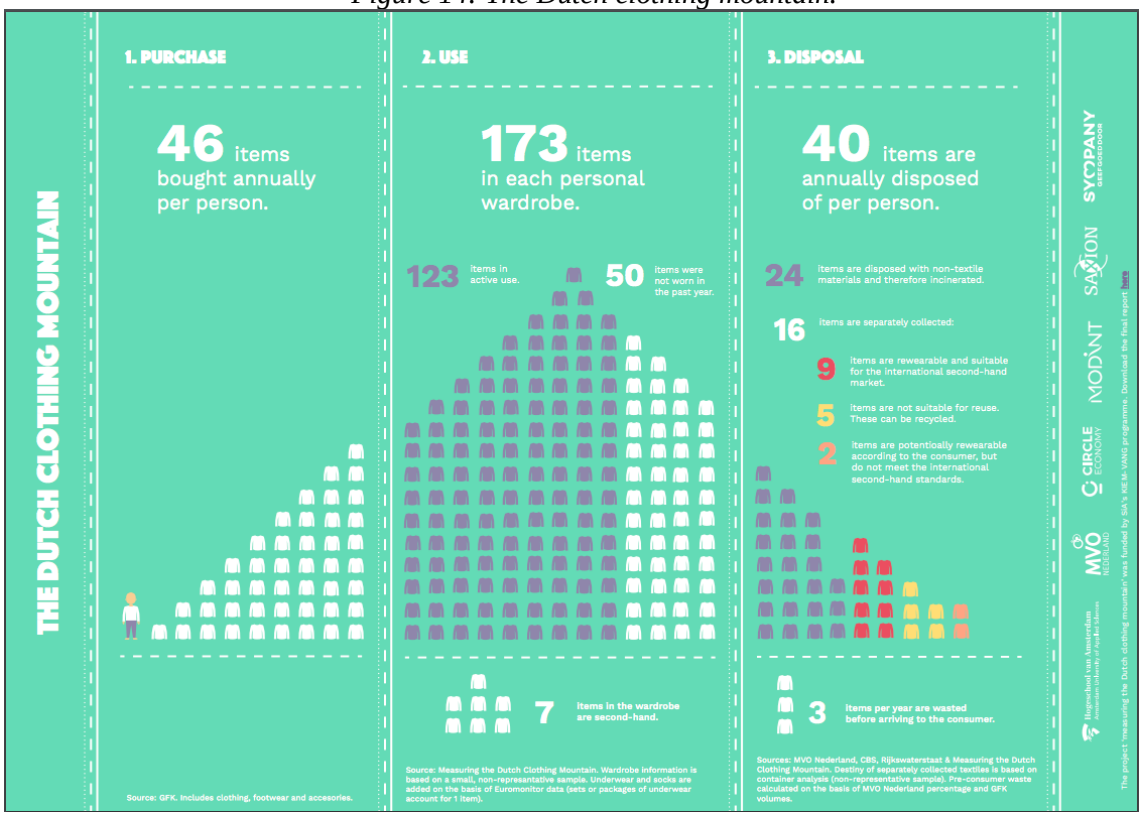
In terms of contemporary manufactures that have a national identity, the Dutch fashion industry does not approach its uniqueness as a cultural heritage, but as products that resemble the Netherlands. From the use of the national flag colours to the incorporation of famous designs by van Gogh, the design are made to have identity, but are still relatable and attractive to foreign consumers (SMELIK, 2017). The author argues that the Dutch national style is composed of national and transnational connotations of fashion, encompassed by a rich, complex and dynamic globalised market.

Regarding national production, the Dutch textile market only accounts for one percent of the world market (IRBC, 2018). According to a study carried by Fashion United (2016), in 2015 the domestic value market of the Dutch fashion industry was 16 billion dollars, importing 19.5 billion dollars of products and exporting of 13 billion dollars' worth of garments.

The five largest Dutch fashion companies, in decreasing order, are: *C&A*, *G-Star*, *Excellent Retain Brands B.V.*, *Veldhoven Group*, and, *Hunkemöller*; which, along with other brands in the country, employ approximately 90 thousand people in retail (FASHIONUNITED, 2016).

Additionally, the consumption of clothing by the Dutch population (Figure 14) was measured in a research at the Hogeschool van Amsterdam (MALDINI *et al.*, 2017), and found that the average number of pieces of clothes acquired per year, per person, is 46. Furthermore, the study discovered that Dutch consumers keep, approximately, 173 items of clothing in their wardrobe, from which 50 (29%) have not been used in the past year and less than 3% are second-hand.

Figure 14: The Dutch clothing mountain.



Source: Maldini, et al., 2017.

Maldini and colleagues (2017) also identified that, annually, 40 pieces of garments are disposed, per person, from which 24 (60%) go directly to the waste and the rest is managed separately: rewearable and suitable for international second-hand market (22,5%), recycled (12,5%), and, potentially rewearable, but do not meet second-hand standards (5%).

Furthermore, the study showed that women, young adults and people living in bigger cities own more clothes than men, older adults and people living in towns and villages and

that 3 pieces of clothes are lost in the supply chain before reaching the consumer, per year (MALDINI *et al*., 2017). The authors highlight the need to reduce what they call 'the Dutch clothing mountain' by involving designers, companies, the government, and consumers.

Regarding the important and distinct features of the country's fashion industry, the Netherlands stands out because of its its denim products, housing brands like *G-Star* and *Denham*, as well as its supply of wax print fabrics, mainly by Vlisco (FASHIONUNITED, 2016).

The sector is described by Kapfunde (2018), as conceptual, open-minded, pragmatic, process-oriented and innovative, and its strengths include: well-educated and forward-thinking designers, who market Dutch creations in the international market, leading to the growth of national brands sales overseas (HOLLAND TRADE AND INVEST, 2019).

Concerning new trends, Teunissen and van Zijverden (2016) point out that some Dutch brands envision and serve new kinds of consumers, building a more committed relationship with them. *Mudjeans*, for instance, lease products that are returned after use and upcycled, to gain new life (MUDJEANS, 2019). Other Dutch companies have business models targeting closed loops, that is, the reuse of materials, such as *Desso* and *Interface* who apply this practice in the production of carpets and home wear (TEUNISSEN; VAN ZIJVERDEN, 2016).

3.3. The Circular Apparel Sector

This section gathers the state-of-the-art literature on the circular apparel sector. Many researches regarding this theme have been published, concerning the challenges of businesses transition to a CE (DANO; DRABIK; HANULAKOVA, 2020; HOTSTROM; BJELLERUP; ERIKSSON, 2019), waste reduction and recovery (AMARAL *et al.*, 2018; SHIRVANIMOGHADDAM *et al.*, 2020) innovative designs (EARLEY, 2017), consumer behaviour (BAIER; RAUSCH; WAGNER, 2020; DIDDI; YAN, 2020), among others.

Fischers and Pascussi's (2017) paper gives an insight into new organisational forms derived from the transition to a Circular Economy, taking as evidence the case of the Dutch textile industry.

The authors state that in the Dutch textile industry several circular strategies are being explored, such as material (re)redesigning (Fashion Positive), product-as-service (Turntoo, Lena Fashion Library, Mud Jeans), resource recovery after user life (Circle Economy Fibersort), establishing standards of post-consumer recycled materials (House of denim) and

facilitating a whole circular value chain (Dutch aWEARness) (FISCHER; PASCUSSI, 2017).

According to this scenario, Fischer and Pascucci (2017) have found a dichotomy, that is, two organisational pathways to the circular apparel sector, the status quo arrangement, based on optimising circular technologies and infrastructure, and the product-as-service arrangement, which focuses on providing PSS contracts.

Houdine, a Swedish sportswear brand, apply circular strategies that combine both pathways, enhancing repairability through design, collecting worn-out garments for recycle, and offering repair and rental services (HOTSTROM; BJELLERUP; ERIKSSON, 2019). The upcycling business was studied by Singh *et al.* (2019) taking as example a British company. Malwee, an important Brazilian apparel brand, focuses their circular efforts on material recovery at their own site, using them as raw materials again (ROSSI *et al.*, 2020).

Real, Lizarralde and Tyl (2020) addressed their study to niche cases in France: a coworking community of sewers, an industrial ecosystem and upcycling centre, a reuse centre and a brand that promotes the use of natural resources. And take-back systems we followed by Stal and Corvellec (2018) in seven Swedish apparel companies and by Hvass and Pedersen (2019) in an existing Scandinavian business. Additionally, PSS case studies were carried in Swedish fashion organisations (STAL; JANSSON, 2017).

It is evident that there is great variety of case studies in the circular apparel literature, and regardless of circular business model, organisational pathway, company size, and country, all these researches identified barriers and optimum business environments (requirements) for a circular transition.

Real, Lizarralde and Tyl (2020) defend the active role of social entrepreneurs in supporting circular transitions into regions and highlight the strong diversity of challenges they face during the design of local business models, at a technological, social and policy level.

Niche businesses can be easily constrained by existing policy frameworks and face social challenges that combine managing fair practices for workers, facilitating transparent processes of governance and empowering users in sustainable behaviours, while dealing with appropriate scale of production and accessibility and adaptability of technologies (REAL; LIZARRALDE; TYL, 2020).

Dano, Drabik and Hanulakova (2020) found that medium-size textile companies in Slovakia have shown positive attitudes regarding CE principles, however, these practices

have been mostly motivated by economic intentions and legislative restrictions, although companies report an increase in costumers' expectations regarding sustainable offerings.

These textile companies also declare a concern towards high entry costs (financial demands) and technological and logistical difficulties, which harms the implementation of circular business models (DANO; DRABIK; HANULAKOVA, 2020). Concerning financial mechanisms, a main issue identified by Fischer and Pascucci, (2017) is the need for facilitated joint investment, usually solved by multiple stakeholders that co-finance a project, and the lack of financing of PSS business models, as banks commonly forecast business success using performance indicators based on standard linear approaches.

According to Hvass and Pedersen (2019), the main financial aspects concerning a take-back system are how to build an economically sound system and how to get the collected fibres into new products at a reasonable expense. On the other hand, Stal and Corvellec (2018) state that while the take-back systems may express itself as cost in terms or outsourcing, it captures value through internal separation and reselling of the products. However, it results in a horizontal decoupling strategy, creating a gap between the take-back systems and the linear business model that still dominates these firms (STAL; CORVELLEC, 2018).

When it comes to infrastructure management, it is crucial to choose a partner for reverse logistics, and to enhance organisational learning, new capabilities, and alignment, achieve goals through common strategies, structures, and culture (HVASS; PEDERSEN, 2019).

Moreover, the need for further R&D in the field of new fibres and textiles was also reported by the companies, that are concerned with material quality (DANO; DRABIK; HANULAKOVA, 2020).

Therefore, pursuing the development of a robust business model for sustainable fashion consumption involves key areas, as value proposition and how it develops over time; new channels of profitability; collaboration and a transparent relationship among actors of the value chain; develop capabilities and resources, from new services to innovative technology; knowledge and skills to manage change; identify barriers; increase the efficiency of the business model; and understand the customer behaviour and how it needs to be addressed by the company (HOTSTROM; BJELLERUP; ERIKSSON, 2019).

Regarding the value chain, Singh *et al.* (2019) suggest that the challenges are perceived differently from distinct stakeholders, primarily because of their linear mindset, focusing only on the issues that affect them directly. However, it was found that individual

success across the value chain is interdependent on other stakeholders' success, that is, it lacks an understanding about systemic collaboration (SINGH *et al.,* 2019).

Staicu and Pop (2015) advocate that social entrepreneurs, as those engaged in waste collection, recycling and upcycling, are not properly represented in the structural constellation of the CE model. Accordingly, it has been proven to be particularly important the arrangement of new contracts among partners participating in the material flows, which results in improved materials for many fashion brands and textile sectors (FISCHER; PASCUSSI, 2017).

Additionally, as long specific designs and know-how are preserved, Dutch apparel companies showed willingness to cooperate to improve processes for all the value chain, stimulating the circular transition of other organisations (FISCHER; PASCUSSI, 2017).

The material flow of the circular apparel industry has also gained a lot of attention from researchers. Sandvik and Stubbs (2019) studied the supply chain of textile recycling and state that the need to redirect textiles waste streams, reinforced by legislations and business opportunities, is a key driver of this circular supply chain and is enabled by the access to clothes that would end up in landfills/incineration, the rapid development technologies and design that enhance circularity, and systemic collaboration.

Shirvanimoghaddam's *et al.* (2020) paper presents the importance of textile waste recycling in a through literature review, as well as many approaches for repurposing these materials, such as sound and microwave absorbing, building material and reinforcement, and heavy metal absorbent and removal.

Amaral *et al*. (2018) research found out that the lack of tax incentives and great logistics and transportation costs in countries such as Brazil can equal the recycled and the virgin textile fibres expenses, which hinders textile recycling. Additionally, the absence of and selective waste collection, cost of current sorting practices, lack of stakeholder involvement, technological challenges (separation of blends, separation of additives and trims, restoring quality and sustainability of processes) may result in the loss of tons of textile resources (AMARAL *et al*., 2018; SANDVIK; STUBBS, 2019).

Material flow also takes part in the three-dimension indicator (material, economic and social) proposed by Rossi *et al.* (2020), which was applied to an apparel industry. By adopting circular strategies, this company reduced losses in the production processes and the consumption of raw materials, incorporating 7% of recycled raw materials; reduced 12-15% of electricity consumption in the last three years while using 100% of renewable electricity; and, reduced the generation of waste and is developing strategies to close the cycle; however,

the company did not developed strategies to extend the life cycle of their products (ROSSI *et al.*, 2020).

On the other hand, authors reported difficulty in gathering data on economic and social dimensions, even considering that most of the positive impacts derived from CE are presented in the social dimension (e.g.: mindset change and job creation) (ROSSI *et al.*, 2020).

Besides the business environment, challenges and drivers for a circular transition, supply chain and stakeholder management, material flows and circular indicators, there is a prominant field of circular design.

According to Earley (2017), design can be a transformative tool to build systemic change in the industry, as well as a powerful force to re-align values, ethics, and culture. Circular Design brings together the idea that resources must be kept in use constantly, reflecting in new businesses and communities' systems.

The author also reflects on the impact of the circular design in the work and role of the designers, which includes communication and collaboration, and the principles of CE directed to the user needs, business models, materials and technology (EARLEY, 2017).

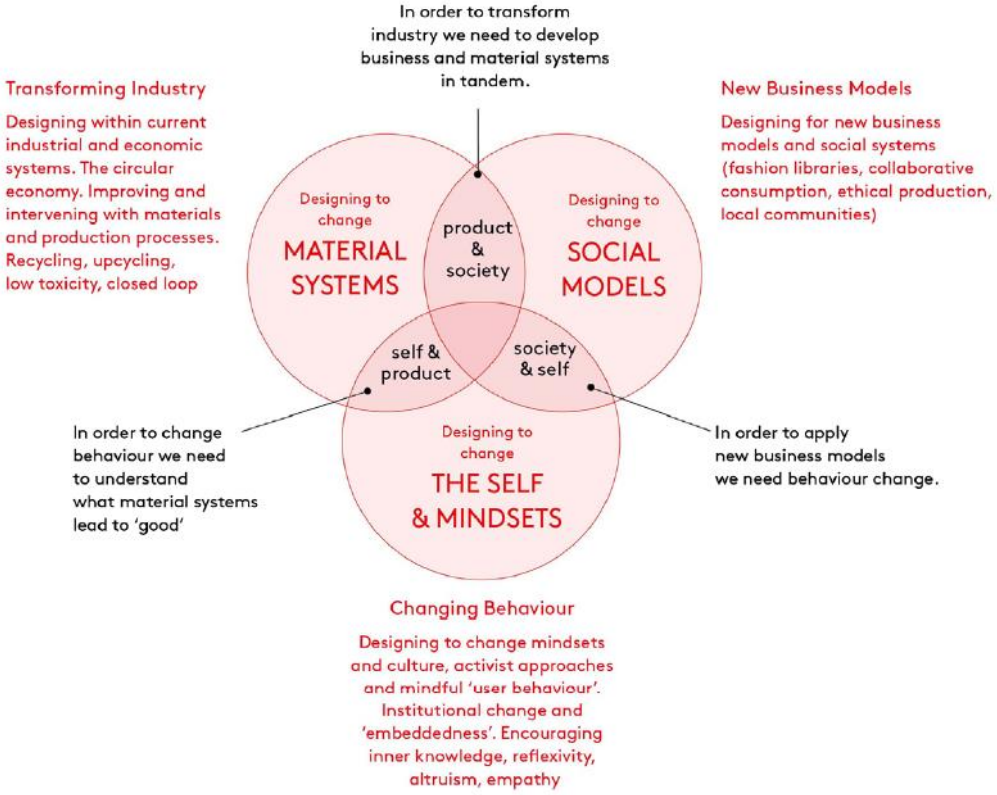
One of the tools used to bring circularity to design of the textile industry is TEN (Figure 15), a set of ten cards/guides that encompass, for example, design to minimize waste, design to reduce the need to consume, and design for cyclability (TED RESEARCH, 2011).

Figure 15: The TEN.

Source: TED Research (2011)

Likewise, the Materials, Models and Mindsets framework (Figure 16) is an interesting tool that guides designers on how to respond to technology, science and material development (Materials), for novel systems, services, models, business, networks and communities (Models), enabling new behaviours, mindset change and improve decision-making (Mindsets) (EARLEY *et al.*, 2016).

Figure 16: Materials, Models and Mindsets framework.



Source: EARLEY et al. (2016)

The behaviour/mindset change challenge topic and its consumer interface lead to valuable researches that highlight the lack of effective communication, and consumer awareness, acceptance, and engagement on circular activities (HVASS; PEDERSEN, 2019; SINGH *et al.*, 2019).

Nencková, Pecáková and Sauer's (2020) research investigated the disposal behaviour of apparel consumers, showing that many demographic features (gender, age, level of education, income, and number of household members) can explain different behaviours towards textile waste separation. For instance, women have a higher propensity to separate textile waste than men. The same propensity was found to be true among younger, well educated, and with higher income consumers (NENCKOVÁ; PECÁKOVÁ; SAUER, 2020).

Gazzola *et al.* (2020) reached similar results. Their survey reveals that women show more interest in sustainable fashion matters and a growing interest from younger generations towards sustainability and circular economy.

Fashion consumers also envision a change in ethical approaches and the adoption of sustainable strategies and practices in the apparel sector, although, despite the fact that more than 80% of the interviewed consumers would voluntarily donate their used clothes to associations/churches, they are not interested in purchasing used apparel (GAZZOLA *et al*., 2020).

On the other hand, Khan and Rundle-Thiele's research (2019), that uses part of the TPB framework and aimed at understanding the sharing clothe consumption, highlights that those consumers who show high levels of concern about the environment engage in shared clothing usage when they perceive this behaviour as economically favourable and the sharing platform as reliable.

Similarly, Camacho-Otero, Pettersen and Boks (2020) identified the purpose behind the engagement in clothe swapping: environmental and social concern towards textile industry impact, the innovative approach to promote sustainable consumption, and charitable objectives. Regarding the actual participation, the authors stated that mostly women took part in this practice, usually for personal use, but also designers and entrepreneurs would engage to gather items to upcycle or resell.

To conclude, Diddi and Yan (2019) investigated clothes mending (repair), as an alternative of life cycle extension and clothing disposal prevention, regarding consumer perceptions and behaviours. The authors indicated that the American consumers' engagement in clothing repair is minimal (30%) and its main barriers include high costs (time and financial) and not having the necessary skills.

The study also shows that those consumers who expressed a motivation to mend were positively related to sustainable post-consumption behaviour (e.g.: donate, swap, reuse for other purposes) (DIDDI; YAN, 2019).

4. Methodology

This research was developed through the following methodological approaches: Systematic Literature Review, Survey and Roadmap structure development. The combination of methodological approaches strengths this research outcomes. As previously stated, the transition to a CE is a complex and holistic process, and the engagement of consumers in circular consumption systems encompasses many challenges, such as identifying the psychological and contextual factors hindering or boosting consumer behaviour, the development of business models, products and services that relate to consumers' behavioural profiles, and the choice of communication strategies that raise awareness towards circular economy initiatives. A single methodological approach would not gather the necessary data nor support their analyses. Therefore, data were collected directly from apparel consumers, brands, and other stakeholders, as well as from the CE literature. Furthermore, these data were analysed with a combination of quantitative and qualitative approaches, suitable for rich inputs as the ones gathered during this research.

Each specific goal is related to one or more research tools, according to how it was addressed (Table 5). For each specific goal, called 'set', there are specific deliverables, that is, minor tasks that guide the accomplishment of every established goal, and, therefore, the research's overall objective. The list of sets and deliverables can be found ahead.

Table 5: Methodological approach according to each specific goal.

Specific Goals	Research tools: Systematic Literature Review	Survey	Roadmap structure development
Identify diverse behaviours and mindsets addressed by circular business models	✓		
Investigate the reasons that guide favourable behaviours towards Circular Economy	✓	✓	✓
Address similarities and differences of behavioural patterns in Brazil and the Netherlands, in the endorsement and transition to a Circular Economy		✓	
Analyse the emergence processes of a circular mindset, regarding consumers' engagement in Circular Fashion	✓	✓	✓
Develop the levels and elements of the proposed structure to boost the engagement of apparel consumers			✓

Source: author.

Set 1 – Identify diverse behaviours and mindsets addressed by circular business models.

Deliverables:

1.1. Establish a definition of 'mindset' for the Circular Economy;

1.2. Illustrate evidence of circular mindsets' features;

1.3. Identify the role of behaviours and mindsets in circular consumption systems.

Set 2 – Investigate the reasons that guide favourable behaviours towards Circular Economy.

Deliverables:

2.1. Identify in the Circular Economy literature the contextual and intrinsic factors found to influence circular behaviours;

2.2. Measure the influence of values, beliefs and norms on consumers' circular behaviours;

2.3. Identify the influence of communication and marketing strategies on consumers' circular behaviours.

Set 3 - Address similarities and differences of behavioural patterns in Brazil and the Netherlands, in the endorsement and transition to a Circular Economy.

Deliverables:

3.1. Test the Value-Belief-Norm Theory among Brazilian and Dutch apparel consumers;

3.2. Compare the similarities and differences among Brazilian and Dutch apparel consumers, their influence over fashion consumption, and their endorsement to a transition into Circular Economy.

Set 4 – Analyse the emergence process of a circular mindset, regarding consumers' engagement in Circular Fashion.

Deliverables:

4.1. Identify consistent circular business models within Circular Fashion;

4.2. Relate business models, mindsets, and behaviours, and establish which factors influence their appearance;

4.3. Illustrate the role of mindsets, behaviours, and their influence factors in circular consumption systems.

Set 5 - Develop the levels and elements of the proposed structure to boost the engagement of apparel consumers.

Deliverables:

5.1. Identify the main topics concerning consumer engagement in circular consumption systems;

5.2. Suggest the elements that guide the planning of long-term activities related to consumer engagement in apparel retail companies.

These specific goals were met by the combination of this thesis' main results, a group of five articles. The correlation between specific goals and the articles produced can be found in the following section (Results).

4.1. Research tools

Each methodological approach that was used to carry out this research, as well as their contribution to the research, is presented in detail below.

4.1.1. Systematic Literature Review

A Systematic Literature Review (SLR) was chosen to summarise the existing evidence on circular consumption, focusing on the factors that have been found to influence circular mind-sets and behaviours. We found that are gaps in the CE literature concerning the consumer/user path in the circular economy transition, which we aim to address by the following research questions:

i. Which are the consumers' circular mindsets and behaviours addressed by the CE literature?
ii. Which factors influence consumer engagement in circular consumption systems?

The Systematic Literature Review was undertaken based on the guidelines proposed by Kitchenham (2004) and Conforto et al. (2011). The first step towards this methodological process is to plan and review the SLR, meaning to identify a gap ('the problem') in the literature (previously presented in the first section of this work) and to develop a review protocol (Conforto et al., 2011; Kitchenham, 2004).

This protocol (Table 6) must include: (1) the research questions that the SLR intends to answer; (2) the search strategy, including databases, type of documents and search terms (strings); (3) the selection criteria, which means the criteria for including or excluding the documents in the systematic review; (4) a quality assessment of the individual works; (5) the strategy to extract data; and (6) a schedule to conduct the SLR (Conforto et al., 2011; Kitchenham, 2004).

Table 6: Systematic literature review protocol.

Steps	Application
Research questions	i. Which are the consumers' circular mindsets and behaviours addressed by the CE literature? ii. Which factors influence consumer engagement in circular consumption systems?
Search strategy	i. Databases: Scopus and Web of Science ii. Types of documents: articles published in English iii. Search strings: (a) 'circular economy' and 'mindset'; (b) 'circular economy' and 'consumer behavio*r'; (c) 'circular economy' and 'consumer acceptance'; and, (d) 'circular economy' and 'behavio* change'.
Selection criteria	The review was conducted according to the iterative process suggested by Conforto, Amaral and Silva (2011), which includes three filters; the first one analyses the title, abstract and keywords, the second the introduction and conclusion, and the third the whole document. As these three phases concern hugely different sections of the documents, each filter had a specific inclusion criterion: i. First filter: the article must include the themes of circular economy and mind-set or behaviour. ii. Second filter: the article must approach behaviour or behaviour change of consumers when facing circular offerings; iii. Third filter: the article had to present at least one circular mind-set or a circular behaviour or indicate factors that influence circular behaviours.
Quality assessment	This assessment was done by restricting the search to papers published by peer-reviewed journals.
Data extraction strategy	The data extracted from the papers included after the third filter were organised in a spreadsheet containing the following information: authors, title, journal, year, DOI (Digital Object Identifier), circular mind-sets, circular behaviours, and influences on circular behaviours. If the paper presented a case study, the following data were also collected: circular business model, location of case study, and type of product studied.
Schedule	The SLR timetable was defined by a first search (January 2020), application of inclusion criteria and data extraction and documentation, followed by an update of the first search (September 2020).

After the planning and review stage, we conducted the SLR (Table 7) following the established protocol (Kitchenham, 2004). The first search was undertaken in January 2020 and returned 131 papers, resulting in 75 articles catalogued after excluding repeated ones.

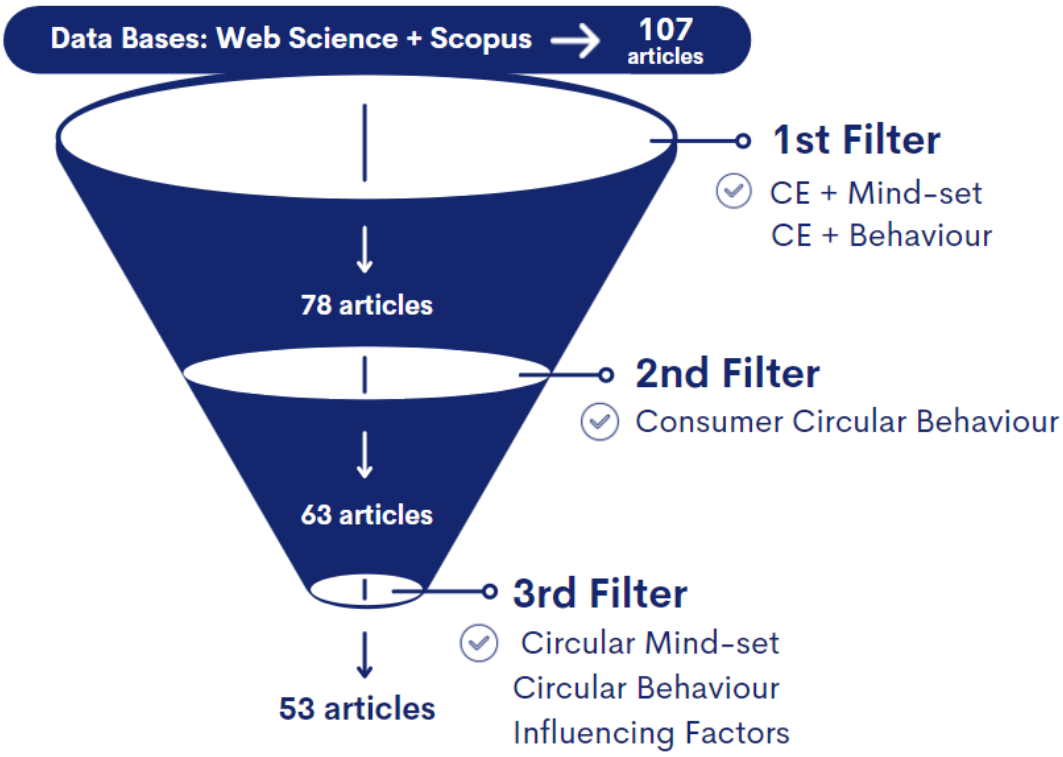
This search was subsequently updated using the same strings and databases in September 2020, returning 55 new articles, from which 32 were not repeated.

Table 7: Conducting the SLR

Search String	Number of Papers			
	1st search		2nd search	
	Scopus	Web of Science	Scopus	Web of Science
"circular economy" and "mindset"	12	8	5	4
"circular economy" and "consumer behavio*r"	38	27	20	15
"circular economy" and "consumer acceptance"	12	10	2	6
"circular economy" and "behavio* change"	13	11	2	1

Therefore, 107 articles were reviewed in this SLR, from which 78 attended the first inclusion criteria, 63 the second and 53 the third (Figure 17).

Figure 17: Systematic Literature Review.



4.1.2. Survey

The survey's purpose in the present study is to accomplish Sets 2 (investigate and evaluate the reasons that guide favourable behaviours towards Circular Economy), 3 (analyse the emergence process of a circular mindset, regarding consumers' engagement in Circular Fashion) and 4 (address similarities and differences of behavioural patterns in Brazil and the Netherlands in the endorsement and transition to a Circular Economy.).

The questionnaire was developed during the researcher's internship at the University of Groningen with the guidance of professors Ellen van der Werff and Thijs Bouman. The elaboration occurred through three months of interactive processes, which validated each one of the questions formulated, the adequacy of indicators with the research theme and objectives, the distribution of questions and sections, and the sentences' phrasing.

The survey's development process started with the consolidation of the research's question and objectives, which were defined at an early stage of the study. Following this step, a theoretical search was conducted, aiming at the identification of consolidated methodologies that may fulfil the goals established, such as Richins' and Dawson's (1992) consumer values orientation measurement and Schultz's (2000) egoistic, altruistic and biospheric values scale, resulting in a combination of assessments.

From these methodological references, a set of indicators were defined, based on their adequacy to the theoretical reasoning and the overall objective, that is, to promote the emergence of users' circular mindset. Then, hypotheses were constructed to test these indicators and the survey.

Considering the research's objectives, indicators selected and hypotheses to be tested, the development of questions initiated. Several queries were suggested to each indicator and through an interactive and scrutinous process the questionnaire was completed with 25 questions. Later, experts at the University of Groningen conducted a content and semantics validation, which resulted in the survey presented in Appendix 1.

Therefore, the survey's main goal was to gather data on patterns of consumption, consumers' understanding of environmental issues and its impact on decision making, their values, beliefs, contextual factors, as well as social norms. The indicators used in the survey, their description and theoretical reasoning for the application can be found in Table 8.

Table 8: Survey's indicators and factors.

Indicators	Description	Reasoning	Corresponding question(s) in the Survey (Appendix 1)
Consumption patterns	A set of relationships and experiences a consumer becomes involved in during the act of consumption (FIRAT, 1987).	The study of consumption patterns is important for a number of reasons: finding significance on business conditions, getting information on economic welfare and living standards, a way of measuring economic performance, and, hosting successful public policies (CLEMENTS; SELVANATHAN, 1994).	3.1; 3.2; 3.3; 3.4; 3.5; 3.6; 3.7; 3.8; 3.9
Awareness of consequence	Knowledge and perception of the environmental problems caused by a particular behaviour (VAN DER WERFF; STEG, 2015).	If the aim is to change a specific behaviour, such as energy use, people should be made aware of the environmental problems caused by this behaviour. Also, they should be informed about how they can contribute to reducing these problems (VAN DER WERFF; STEG, 2015).	4.1
Environmental self-identity	The extent to which you see yourself as a type of person who acts environmentally friendly (VAN DER WERFF; STEG; KEIZER, 2013).	Environmental self-identity is considered to be an important antecedent of environmental preferences, intentions, and behaviour (VAN DER WERFF; STEG; KEIZER, 2013).	4.4

Biospheric values	Reflect a concern with the quality of nature and the environment for its own sake, without a clear link to the welfare of other human beings (STEG *et al*., 2014).	The more biospheric and altruistic, and the less egoistic, one's general values are, the more one should believe the planet is a delicate, threatened, and interconnected system, which leads to the belief that acts that harm the environment have adverse consequences (GIFFORD, 2011).	2.1
Materialistic values	The centrality of acquisition-related activities in a person's life and how they prioritize possessions over other things in life (RICHINS; DAWSON, 1992).	Materialistic values influence how people interpret their environment and structure their lives (RICHINS, 2004).	2.2
Personal norms	Experienced as feelings of a moral obligation to perform a certain behaviour (SCHWARTZ, 1973)	Personal norms, when activated, provide guidance on how to act sustainably in specific situations (OLBRICH; QUAAS; BAUMGÄRTENER, 2011).	4.2; 5.2
Social norms	Patterns of behaviour that are self-enforcing within a group: everyone conforms, everyone is expected to conform, and everyone wants to conform when they expect everyone else to conform (YOUNG, 2015).	Perceived social pressures to behave in a certain way play an important role in shaping behavioural intentions, which themselves constitute the major determinant of actual behaviour (DORAN; LARSEN, 2016).	4.3; 5.3
Intention	The degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour (WARSHAW; DAVIS, 1985).	Acquiring sustainable and ethical alternatives is often a question of one's own willingness to change consumption patterns (WIEDERHOLD; MARTINEZ, 2018).	5.1
Outcome Efficacy	It reflects to which extent an individual feels they contribute to reducing the environmental problem by changing their behaviour (SCHWARTZ, 1977).	Individuals with strong feelings of outcome efficacy should engage in actions that decrease negative environmental impacts (VAN DER WERFF; STEG, 2015)	4.1; 5.4

Intrinsic Motivation	Motivation to engage in a behaviour through a feeling of rewarding (TAUFIK *et al*., 2015).	When people decide to act pro-environmentally because they are intrinsically motivated to change is much more likely to be sustained over time (VAN DER LINDEN, 2015).	5.2; 5.3
Perceived behavioural control	Individual perception of the ease or difficulty of performing a certain behaviour of interest (AJZEN, 1991).	A person will not engage in pro-environmental actions if they don't believe that they are able to reduce negative environmental impacts (GIFFORD, 2011).	5.5
Availability	The quality of being able to be used or obtained (MERRIAM-WEBSTER, 2019a).	Availability plays a crucial role in the consumer's purchasing criteria and inhibits consumers when the range of ethical and sustainable offers is limited (WIEDERHOLD; MARTINEZ, 2018).	5.5
Price	The amount of money given or set as consideration for the sale of a specified thing (MERRIAM-WEBSTER, 2019b).	Price is a decisive element of the purchase decision making (BRAY; JOHNS; KILBURN, 2011) and can be favoured by consumers, in comparison to their care for environmental protection, as a way to get greatest benefits for themselves (WIEDERHOLD; MARTINEZ, 2018).	5.5; 5.6
Convenience	The state of being able to proceed with something without difficulty (OXFORD UNIVERSITY PRESS, 2019).	If an environmentally friendly option is less convenient for consumers, it is less likely that they will engage in this behaviour (FELIXDÓTTIR, 2017).	5.5
Nudges	Any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives (THALER; SUSTEIN, 2008).	Use nudging can promote more environmentally friendly behaviour (NIELSEN *et al.*, 2016).	5.6

Source: author

As the survey is mostly addressed to native Brazilians and Dutch, a translation to Portuguese and Dutch was needed. This procedure was carried following the instructions on Forward and Backward Translation (WHO, 2019), that is, the author of the instrument (questionnaire) translated it to Portuguese, targeting conceptual language equivalents, followed by a third party (bilingual) who checked this translation to, then, an independent translator, who had no knowledge of questionnaire, translate it back to English, finally, the two versions in English were compared, validating the translation to Portuguese (Appendix 2). The same process was carried with partners in the Netherlands, validating the questionnaire in Dutch (Appendix 3).

The three versions, in English, Portuguese and Dutch, were digitalized and made available at online platform (Survey Monkey and *Panelinzicht*), from which the survey was shared after an empirical validation. This last validation was carried by a controlled group of ten experts and non-experts who tested the survey's interface, easy and difficulty of context and understanding, guaranteeing a clear and user-friendly instrument.

As the expected sample population were apparel consumers, the only condition to take part the study was to consume clothing goods and be older than 18 years old. The answers were collected between September/2019 and February/2020, combining 875 responses, 369 assembled in the Netherlands and 506 in Brazil. However, due to incomplete responses, some answers were not validated, resulting in 272 responses from Dutch consumers, 289 from Brazilians and 37 from other nationalities (as British, Colombians and Germans), 598 on total.

After a first analysis on the variables correlations and previous studies concerning circular consumer behaviour, the Environmental Psychology's model chosen to be tested were the Value-Belief-Norm theory. The VBN theory and the casual pathways between its variables were tested with a series of regression and mediation analyses [STEG et al., 2005]. We calculated bootstrapping confidence intervals for multiple-step models to test mediation effects using the PROCESS macro model 6 [HAYES et al., 2010]. To compare the predictive power of the VBN theory for the different dependent variables collected in both countries, Brazil and the Netherlands, we calculated 95% confidence intervals around the R^2 values [SMITHSON, 2001]. We considered R^2 values of the regression model to be significantly different when the overlap of the 95% confidence intervals is less than half the distance of one side of the confidence interval [MASSON; LOFTUS, 2003].

The results derived from the survey were crucial to understand how behaviours influence the manifestation of circular practices and, therefore, the emergence of a circular mindset.

4.1.3. Roadmap structure development

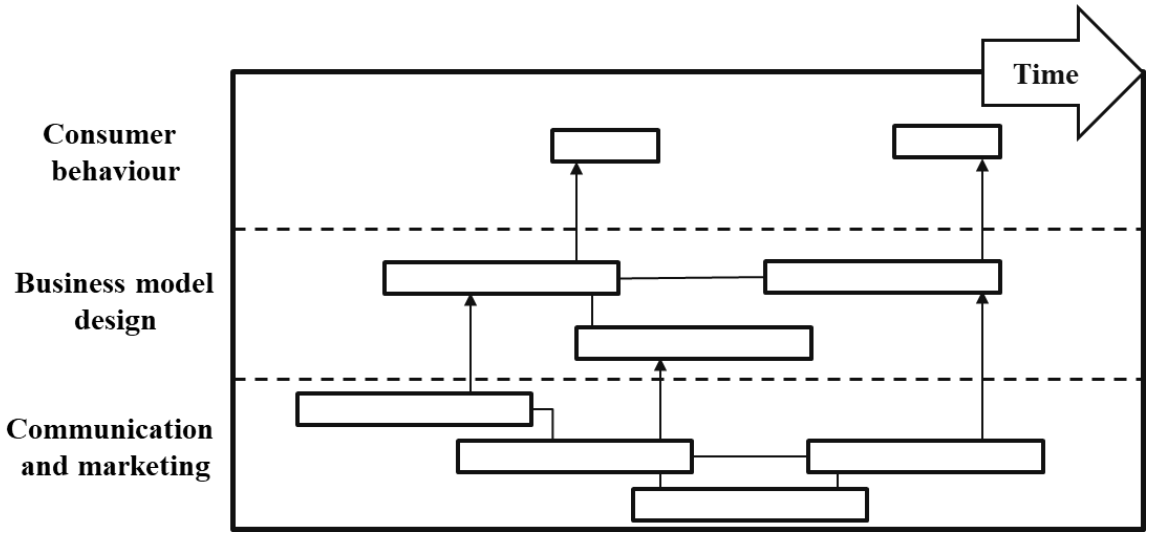
The third and final step of this research was to draw up a process that will boost the boost the engagement of apparel consumers in circular consumption systems, designing and illustrating it as a roadmap structure. A roadmap is a tool used to achieve a desired outcome. In other words, it is a strategic planning technique that includes the necessary steps and milestones to accomplish the determined goal (CAETANO; AMARAL, 2011).

Roadmaps also work as important communication instruments that support strategic alignment, that is, they facilitate the dialogue and articulation between different actors involved in a process or plan (ROCHA; MELLO, 2016). This tool supports the communication between resources, organisational goals, and changes in the environment (OLIVEIRA; ROZENFELD, 2010).

Moreover, this is a flexible tool, commonly used for long-range planning, and can have a multiorganizational target, that is, it captures the landscape, threats, and opportunities for a particular group of stakeholders in an application field (PHAAL; FARRUKH; PROBERT, 2004). Roadmaps have been adapted to support many strategic aims, however, one of its main traits is to be a time-based structured framework, that is, they represent and communicate strategic plans in a temporal sequence (PHAAL; FARRUKH; PROBERT, 2004).

Roadmaps can have different purposes (e.g., product planning, capability planning, integration planning, etc.) and representations (e.g., bars, tabular, graphical, etc.) (PHAAL; FARRUKH; PROBERT, 2004). Ours was designed as a strategic planning roadmap, that is, starting from a future vision for the organization, it guides the mapping of the current position and the identification of gaps, to then provide the tools to achieve the organization's future vision. Additionally, it was represented in a multiple layer format, allowing the tracking of the evolution within each layer together with the interlayer dependencies (PHAAL; FARRUKH; PROBERT, 2004). However, differently from the traditional 'technology, product and market' layers, our roadmap structure was represented according to our main themes: consumer behaviour, BM design and communication and marketing (Figure 18).

Figure 18: Roadmap structure format (adapted from PHAAL; FARRUKH; PROBERT, 2004).



According to these features previously described, we developed our roadmap structure based on the data collected from earlier stages of this PhD research. The roadmap was, therefore, the final output of this research, presented at the fifth paper, and each previous paper provided crucial inputs for the roadmap development. These data and results were further enriched with evidence collected from two Brazilian apparel companies, through semi-structured interviews.

Semi-structured interviews are commonly used to collect qualitative data, primarily because of its versatility and flexibility (KALLIO et al., 2016). Fylan (2005) defines semi-structured interviews as conversations that are structured by a set of open and instigating questions, and that are free to vary according to the participants, that is, enabling improvised follow-up questions based on participants' answers (KALLIO et al., 2016).

There are three main steps to conducting semi-structured interviews: (i) evaluate previous research on the intended topic, as the questions are based on previous knowledge; (ii) identify the sample population, that is, who you are interested in talking to; and (iii) develop the interview schedule, the list of questions that will be addressed during the interview, including a logic order (FYLAN, 2005).

The first step for conducting our semi-structured interviews was completed in the previous phases of the PhD development, gathering comprehensive information on the apparel sector in Brazil and the opportunities and barriers for the engagement of apparel consumers in the CE. Following, we defined the criteria for the involvement of apparel companies in this study: companies that commercialize circular apparel products (under any approach of CBM), that communicate their efforts towards the CE, and that operate in Brazil.

Lastly, we developed the interview schedule (Appendix 4), which was divided into the three main topics: circular business model, communication and marketing, and consumers' profile (sociodemographic and psychological factors).

The interviews were carried out in January and March of 2022, virtually and in Portuguese, with the founder and owner of Company A and the sustainability manager of Company B. Company A was founded in 2018, and it has one physical store, located in the state of São Paulo – Brazil, and online channels for sales. Company A promotes timeless, versatile, sustainable, and vegan women's clothing, it sources fabric considering sustainability factors (types of materials, reliability of producers, etc.), and it values the local workforce, as the designs are developed by the owner and the assembly is done by seamstresses from the same location as the physical store.

Company B groups 17 apparel brands and two platforms, with more than 500 physical stores across all Brazilian states, working with a wide range of clothing, footwear, and accessories items. The company was founded in the 1970s, as a single brand, and became a corporation in the 2000s with the fusion of two brands. 10% of what is commercialized by Company B is produced by them, the remaining is outsourced to suppliers located within a 50 Km radius from the company's headquarters. Currently, of the 19 initiatives, three on them (B1, B2 and Alme) strongly incorporate circular economy principles and adhere to CBMs. B1 is an online platform for selling and buying second-hand apparel, focused on luxury brands. B2 has a menswear collection with products made from recycled cotton, fabrics scraps, and post-use jeans. And B3 sells footwear 100% carbon neutral.

We chose these different companies to compare their approaches on our three focus themes (business model design, communication and marketing, and consumer behaviour), aiming to achieve a roadmap that is flexible in terms of CBM, apparel product, size, and location, yet, that still provides structured guidance towards the engagement of consumers in circular consumption systems.

5. Results

This research's deliverables are presented in an article style (Table 9), and the results are divided into five articles, that gather the development of this work.

Table 9: Articles according to deliverables' sets.

		Deliverables				
#	Articles	**Set 1 - Identify diverse behaviours and mindsets addressed by circular business models**	**Set 2 - Investigate the reasons that guide favourable behaviours towards Circular Economy**	**Set 3 - Address similarities and differences of behavioural patterns in Brazil and the Netherlands, in the endorsement and transition to a Circular Economy**	**Set 4 - Analyse the emergence process of a circular mindset, regarding consumers' engagement in Circular Fashion**	**Set 5 – Develop the levels and elements of the proposed structure to boost the engagement of apparel consumers**
1	Systemic Circular Innovation: Barriers, Windows of Opportunity and An Analysis of Brazil's Apparel Scenario	Background				
2	The establishment of metrics on circular consumer behaviour: an application in the apparel industry		✓			
3	Role of consumer mindsets, behaviour, and influencing factors in circular consumption systems: A systematic review	✓	✓		✓	
4	Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and in The Netherlands		✓	✓	✓	
5	Consumer engagement in circular consumption systems: a roadmap structure for apparel retail companies		✓		✓	✓

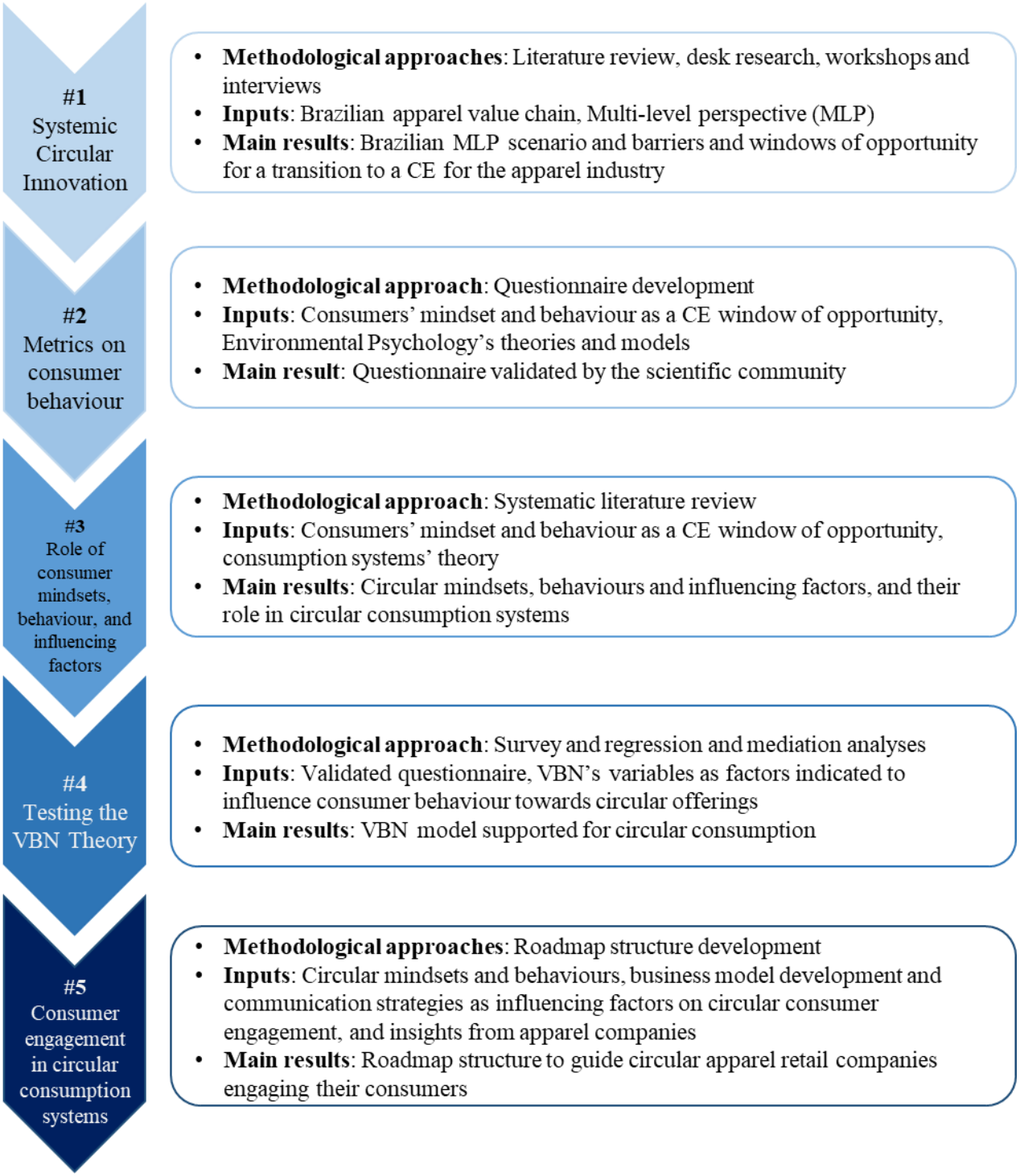
Source: author.

The first article is a background study and forecast assessment of the circular fashion in Brazil and presents a multi-level perspective scenario, based on Geels (2002), and identifies the main barriers and windows of opportunity for the transition to a CE in the Brazilian textile and apparel industry. The focus on consumer engagement was defined, as well as the confirmation of cultural inertia and little consumer awareness as a barrier to the CE transition in Brazil, and the evidence, from stakeholders in the apparel industry value-chain, that the development of circular mindsets could be a window of opportunity for circular initiatives (*article #1* - GOMES et al., 2021). Following, the second article presents the main concepts and theories that sustain the survey's development, that is, what are the behavioural metrics used to collect information on consumers' circular mindset. Then, this research was continued through a systematic literature review for the identification of consumers' mindsets and behaviours related to the circular economy, the factors that affect them, and the determination of their role in circular consumption systems.

The results show that circular consumption systems are realized by the circular flow of products and resources through chained behaviours, that are guided by circular mindsets and influenced by a varied number of contextual and intrinsic factors (*article #3* - GOMES et al., 2022a). Some of these factors were tested among Brazilian and Dutch consumers, to assess if the Value-Belief-Norm Theory (STERN et al., 1999) could explain the willingness of apparel consumers to engage with circular products, a hypothesis that were supported (*article #4* - GOMES et al., 2022b). The fifth and final article gathers all outcomes into a roadmap structure to boost the engagement of apparel consumers in circular consumption systems, combining reflections on consumer behaviour, business model development, and communication and marketing strategies (Figure 19). The roadmap is proposed as a guide for apparel retail companies.

Following, the articles are presented in their published/submitted format, including all authors, the journal/conference, and status.

Figure 19: Articles' sequence.



5.1. Main articles: published or submitted

Systemic Circular Innovation: Barriers, Windows of Opportunity and An Analysis of Brazil's Apparel Scenario

Authors:
Giovana Monteiro Gomes: PhD candidate;
Dr. Natalia Moreira: Aalto University;
Dr. Diego Rodrigues Iritani: University of São Paulo;
Prof. Weber Antonio Neves do Amaral: professor at the Superior School of Agriculture Luis de Queiroz at the University of São Paulo;
Prof. Aldo Roberto Ometto: professor at the São Carlos School of Engineering at the University of São Paulo.
Journal: Fashion Practice
Published online: 8th November 2021
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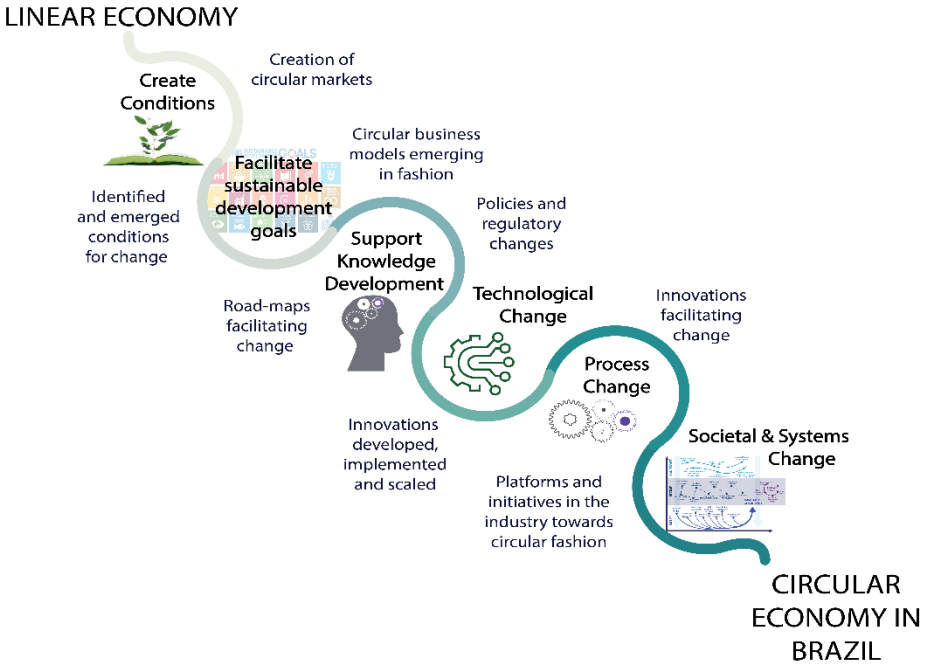
https://www.tandfonline.com/doi/10.1080/17569370.2021.1987645

Abstract

The textile industry has a significant role in the globalized market. However, this sector is responsible for extensive social and environmental impacts, that comprise unhealthy work conditions, huge pollution footprint, and intensive throw-away practices. Aiming to promote solutions to these problems, this paper traces the barriers and windows of opportunity for a transition to a Circular Economy, taking as an example the Brazilian textile and apparel industry. We examine the current Brazilian textile scenario using the multi-level perspective through three methodological approaches: desk research, workshops, and interviews. Our results indicate that, although the Brazilian textile industry still operates mainly in a linear way, focusing on competitiveness and short-term opportunities, there are great niche examples that are gaining traction and inspiring larger organizations, promoting innovative and circular ways to create and capture value. The socio-technical transition to a circular economy encompasses the identification and creation of conditions through windows of opportunity such as circular mindset, collaboration among stakeholders, education, investment, market forces, and public policies, which support process and technological changes in the textile and apparel industry. In

summary, our research comprises the major challenges faced by the Brazilian textile industry in its current scenario and present enablers to endorse the shift towards a circular economy.

Graphical abstract



Keywords: Circular economy. Textile. Apparel. Multi-level perspective. Socio-Technical Systems.

Introduction

The Textile and Apparel Industry is one of the oldest and largest industries globally (Keane and te Velde 2008). It is distinguished by the large number of unskilled labors absorbed by the sector, the low investment costs, but rapid expansion and return capital, and the exportation of textile goods supported by state-of-the-art technologies (Brenton and Hoppe 2007).

Also, the textile and apparel industry is present across the world due to the human necessity for apparel and textile. Thus, this sector plays an important role, not only for the economy, but for the social, cultural, and political dimensions as well, influencing costumes, traditions, and trends, and people's lifestyle over time (Fujita and Jorente 2015).

On the other hand, the textile and apparel industries are characterized by efforts to lower production costs (Allwood et al. 2006). In comparison with developed nations, those countries with abundant and, usually, unqualified labor have an advantage on the 'productivity vs cost'

scale, leading to negative social impacts linked to the outsourced manual labor (Keane and te Velde 2008).

Furthermore, the fashion industry is responsible for a critical pollution footprint, as a result of the use of raw materials, energy-intensive processes, the use of solvents, dyes, and toxic materials, among others (Claudio 2007; EMF 2017a). Its impacts also include processes in the use and after use phases, such as water and energy consumption.

Additionally, linear fashion trends such as fast fashion have changed the market dynamics, including the speed of production, lower quality, the flexibility of design, and overflow of new trends (Arrigo 2013; Bhardwaj and Fairhurst 2010; Gabrielli, Baghi, and Codeluppi 2013; Siegle 2011), stimulating consumers' frequent purchases and the premature disposal of goods (Armstrong, Kang, and Lang 2018), leading to a throwaway culture, in which individuals perceive clothes as disposable goods (Chapman 2009).

These well-known contemporary obstacles and challenges encourage sectors of the textile and apparel industry to invest in innovation, holistic and systemic view, and new business models that incorporate sustainability efforts, as indicated by McKinsey & Company (2017). It is, within this scenario, that Circular Economy (CE) became a fruitful alternative.

CE is motivated by the concept that resources can be used more effectively in closed-loop systems, that is, promoting the recirculation of resources and energy, with the minimization of raw material demand, and the recovery of value from waste (Andersen 2006; European Commission 2014; Geissdoerfer et al. 2017; Kirchherr et al. 2017a; Kirchherr, Reike, and Hekkert 2017b; Prieto-Sandoval, Jaca, and Ormazabal 2018).

The most common approach when defining CE is its focus on material and resource flow and waste management (Blomsma and Brennan 2017; Geng and Doberstein 2008; Hass et al. 2017), however, some authors highlight the importance of product design and value (Webster 2015), generating a positive impact to the environment and society (EMF 2017b; Murray, Skene, and Haynes 2017), technological development (Park, Sarkis, and Wu, 2010), and a change of paradigm on the society-nature relationship (Prieto-Sandoval, Jaca, and Ormazabal 2018).

Therefore, the purpose of a transition from a linear to a circular economy is to decrease impacts on the natural environment, as well as guarantee safe and healthy living and working conditions while providing economic benefits (Ritzén and Sandström 2017), merging social and environmental concerns with economic development.

1.1. Contextualization

The circular transition is grounded in "an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes" (Kirchherr et al. 2017b p. 229). The literature on the circular apparel sector focus, mainly, on the barriers of businesses transition to a CE (Dano, Drabik, and Hanulakova 2020; Hotstrom, Bjellerup, and Eriksson 2019), waste reduction and recovery (Amaral et al. 2018; Shirvanimoghaddam et al. 2020) innovative designs (Earley 2017), consumer behavior (Baier, Rausch, and Wagner 2020; Diddi and Yan 2020).

However, most organizations still operate within a linear mindset, face design limitations (in terms of materials, product architecture, and functionality), are constrained by their position in the supply chain (lack of power to demand circular resources), cannot compete on price nor do they have sufficient customer demand and lack a circular business strategy, all factors that prevent such organizations to go fully circular (Franco 2017).

Brazil's unique position to share examples, cases, lessons learned, and to be part of a global and systemic approach towards circular fashion (which comprises the textile and apparel industry, as well as its stakeholders) is mainly since it has the most complete textile value chain in the western hemisphere (ABIT 2017), as well as a large and diverse internal market with considerable importance for global exports (Sutter et al. 2015). Figure 1 shows the links of the Brazilian apparel value chain, from different 'Raw Materials', through all the phases of manufacturing, sales, and usage present in the Brazilian territory, to the 'Post-Use'. The 'Service' and 'Reverse Cycles' links are present throughout the whole value chain.

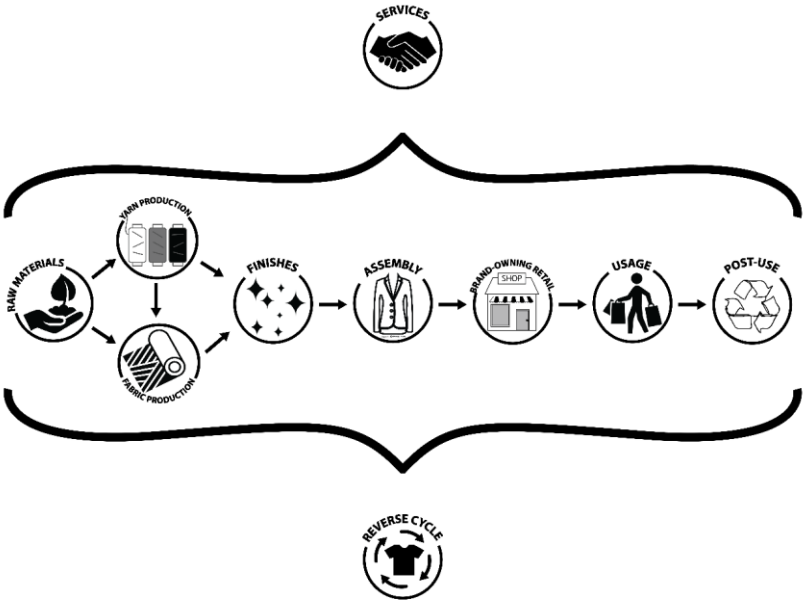


Figure 1: Links of the Brazilian value chain.

Although Brazil is a continental-size country, the Brazilian textile production is clustered within two of its geographic regions: Southeast and South. According to the Brazilian Micro and Small Business Support Service - SEBRAE/BA (2017), in 2012 78,7% of the textile manufacturing units were located in these two regions, representing 75% of the production value. Moreover, according to estimates from the Brazilian Institute of Geography and Statistics - IBGE (2021a) these two regions held approximately 56% of the Brazilian population in 2020.

The current Brazilian textile and apparel industry presented itself as an interesting case study for the analysis of windows of opportunity towards a successful implementation of circularity principles. Considering the focus on the value chain and the fact that the Brazilian apparel and textile industries are comprised of all the individual links of the supply and consumption chains, a multilevel-perspective approach (Geels 2002) was deemed the most relevant for answering the main research question: *which are the main barriers and windows of opportunity to the implementation and management of a circular economy culture in the Brazilian textile and apparel industry?*

The paper here presented is divided into 4 areas: (i) the current Landscape of the Brazilian textile and fashion business portraying the country's peculiarities; (ii) a review of the current regime found in this industry's literature, as well as workshops and interviews with the various stakeholders; (iii) the windows of opportunity within a niche-level for socio-technical innovation transition to a circular fashion sector.

2. Methodology

2.1. Theoretical and methodological framework

The transition towards a circular economy is complex and involves large scales (whole ecosystems), unexplored problems, innovative solutions, and multiple actors, requiring shifts in how systems operate and interact with each other (Jackson, Lederwasch, and Giurco 2014).

These complex interactions and holistic changes are studied by socio-technical systems (Genus and Coles 2008), that is, how the interplay between organizations, their stakeholders, existing knowledge and technologies, and the material flows happens in a system (Geels 2002). Concerning sustainability matters and environmental issues that are also addressed by the circular economy, fundamental changes are required in these systems (Geels 2019), involving technology and innovation, infrastructure, culture and consumption, public policies, business models, market and communication (EEA 2014; EEA 2017, Elzen, Geels, and Green 2004).

The Multi-Level Perspective (MLP) is an approach for "identifying interactions within large-scale transitions and identifying the nature of particular transition pathways" (Jackson, Lederwasch, and Giurco 2014, p.518) and it attempts to clarify the diffusion of different patterns through new socio-technical relations, replacing the existing ones (Genus and Coles 2008). The MLP recognizes the relevance of radical innovation, at the same time it understands that socio-technical transitions are established by many stakeholder groups, engaged in multiple activities (Geels 2019).

Geels (2002) was one of the first authors to suggest a MLP to assess technological transitions (TT), an approach which was eventually used by other authors to address complex problems (Joore and Brezet 2015), such as the transition towards circularity, which encompasses other variables beyond the technological ones (Jackson, Lederwasch, and Giurco 2014). Patterson et al. (2017), for instance, state that beyond the socio-technical and socio-ecological transitions, change processes that involve environmental matters also include sustainability pathways and transformative adaptation, that is, projects that empower marginalized actors and strategies that create new alternatives, respectively.

Therefore, we believe that the transition to a circular textile and apparel industry could be evaluated as a change from one socio-technical system (cluster of elements) to another, considering new pathways and alternatives (Geels 2005; Geels 2019).

The MLP (Geels 2002) is divided into three levels (Figure 2), macro (Landscape), meso (Regime), and micro (Niche). The Landscape consists of the external factors that guide the trajectory of the Regime, which is the existing and stable system's development, that can be disturbed into new configurations by the Niches, a hub of novel ideas, technologies, and processes (Geels 2002).

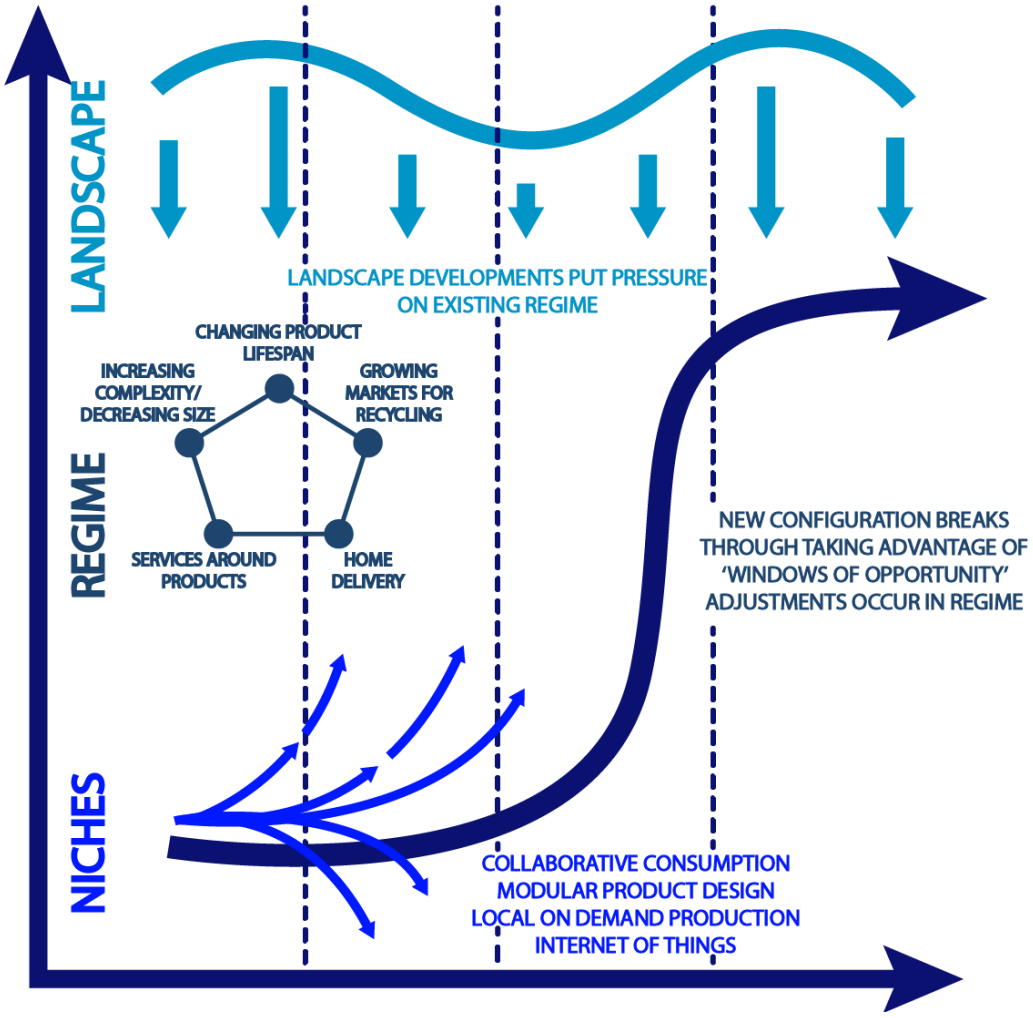


Figure 2: Multi-level perspective analysis (adapted from EEA, 2017; Geels, 2002)

Considering the importance of the actors in socio-technical systems, the first step of this research was to identify and map the stakeholders of the Brazilian textile and apparel value chain. Through desk research/literature review, interviews, and workshops we collected data from these actors, concerning our research question, the barriers, and windows of opportunities in the transition for a circular economy in the Brazilian textile and apparel industry (Figure 3).

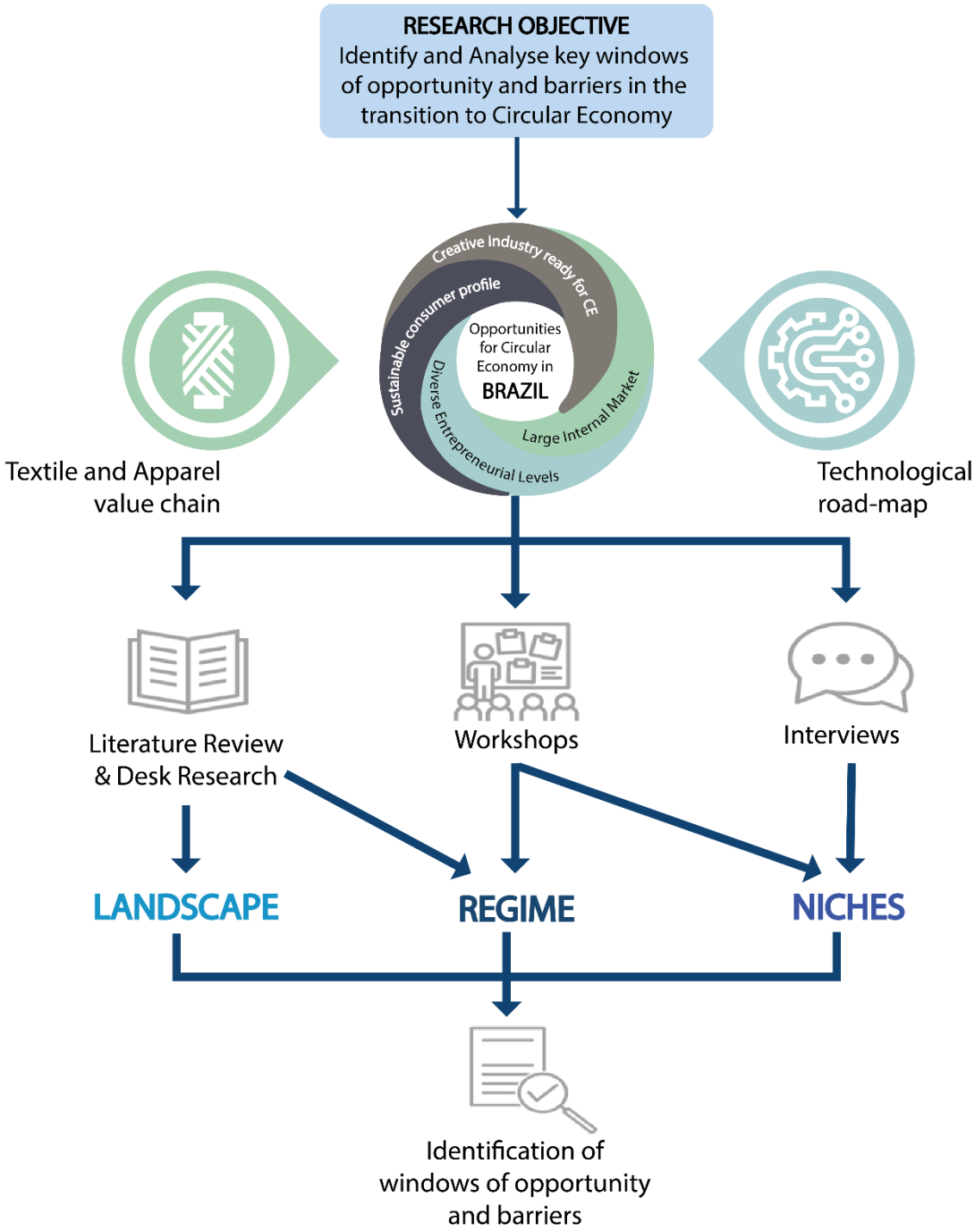


Figure 3: Methodological Framework.

Regarding the MLP, the data collected were arranged in the three levels, Landscape, Regime, and Niches (Table 1), drawing the Brazilian textile and apparel industry scenario.

Table 1: *Data collected at each stage of the multi-level perspective*

Levels	Variables
Landscape	Macro-economy, internal market, international trading, job creation, business trends
Regime	Micro-economy, processes, products and services of the textile value chain, physical infrastructure, environmental and social impacts
Niche	Emerging market trends, business strategies, circular business models, windows of opportunity

By aligning the socio-technical systems and stakeholder analysis, the methodological framework provided more visibility to the issues being investigated: (a) the nested hierarchy of the three layers (Landscape, Regime, and Niche); (b) the barriers and changes and; (c) the windows of opportunity, behind these changes; thus, enriching the data collection, analysis, and review.

2.2. Methodological approach

Literature Review and Desk Research – Landscape and Regime levels

The research underwent thorough desk research and exploratory review of the academic and business literature, using international databases[1], as well as Brazilian databases[2]. The objective of this first phase of the research was to identify evidence of the Landscape and Regime features of the Brazilian Textile and Apparel industry.

This methodological approach provided information on Brazil's socio-economic indicators, such as GPD, and data on the textile and apparel sector, for example, its size and imports and exports rates, mapping the Landscape variables presented in Table 1. Concerning the Regime level, information on value chain features, as the use of raw materials, spatial distribution, and waste generation, was collected.

Workshops – Regime and Niche levels

To address the transition to a circular economy by the lens of socio-technical systems, it is essential to identify the groups of actors responsible for key activities and flows of information, technology, and material (Geels 2019). Therefore, the first step of this phase was the stakeholder

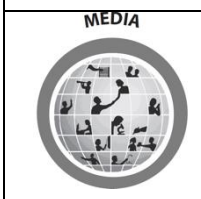
[1] Such as IMF – International Monetary Fund and WTO – World Trade Organisation.

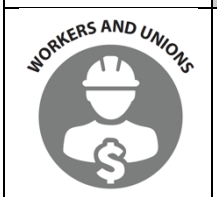
[2] Such as IBGE - Brazilian Institute of Geography and Statistics and ABIT - Brazilian Association of Textile and Clothing Industry.

identification (Table 2), carried out considering the apparel and textile value chain and through the use of Mitroff's Seven Methods (Mitroff, 1983).

These methods propose that all relevant groups of stakeholders are to be included in decision making by critically identifying and assessing the different kinds of inherent stakeholders that exist: Imperative, Positional, Reputational, Social Participation, Opinion-leadership, Demographic and Organizational (Mitroff 1983). Thus, a group of researchers, that included experts on the textile industry, fashion, and circular economy, listed the stakeholder groups for each one of the seven different kinds of inherent stakeholders, resulting in the arrangement in Table 2.

Table 2: *Stakeholder Groups of the Brazilian textile industry*

Icons	Stakeholder Group	Description
	Apparel Associations	Represent the interests of a set of different organizations, attend to their demands and guide these companies
	Consumers	Scrutinize the items and ideas presented to them and validate, or not, these products, consisting of an important part of the market
	Financial Institutions	Define where financial and economic resources are going to be applied, determining the course of the main decisions taken
	Government	Assign subsidies, develop public policies, and determine which materials, products and processes are subject to taxation
	Media	Influences how information is spread, disclosed, and received

	Research, Education, and Innovation	Develop and propagate ideas, models, and procedures, influencing how and when innovations are going to take place
	Brand-owning Retailers	Responsible for what consumers can access, from designs to the final product
	Suppliers	Present in many links of the value chain, such as yarn and fabric production, finishes, and assembly, and they influence important decision-making processes
	Sustainable Associations and Communities	Parties who share pro-environmental beliefs and values, drawing the attention of organizations to their claims
	Workers and Unions	Represent employees across the textile value chain

Following the stakeholder identification, 208 organizations were mapped in Brazil, through desk research, and distributed across the links of the Brazilian value chain illustrated in Figure 1. Additionally, these organizations were also divided by the stakeholder group it belongs (Table 3).

Table 3: *Distribution of the mapped organizations according to their connection to one or more links of the value chain, followed by the distribution of the mapped organizations according to their stakeholder classification.*

Link of the Value Chain	**# of mapped organizations***	**Stakeholder Classification**	**# of mapped organizations**
Raw Material	15	Apparel Associations	12
Yarn Production	14	Consumers	6
Fabric Production	18	Financial Institutions	7
Finishes	11	Government	16
Assembly	42	Media	45
Brand-owning Retailers	31	Research, Education, and Innovation	18
Usage	40	Brand-owning Retailers	23
Post-use	3	Suppliers	45
Services	66	Sustainable Communities and Associations	29
Reverse Cycle	8	Workers and Unions	7

**The total is superior to 208 organizations because some of them are connected to more than one link of the value chain.*

Aiming to embrace all the stakeholder groups and collect data on the Regime and Niche levels, this research promoted two workshops and carried 30 interviews (Figure 4).

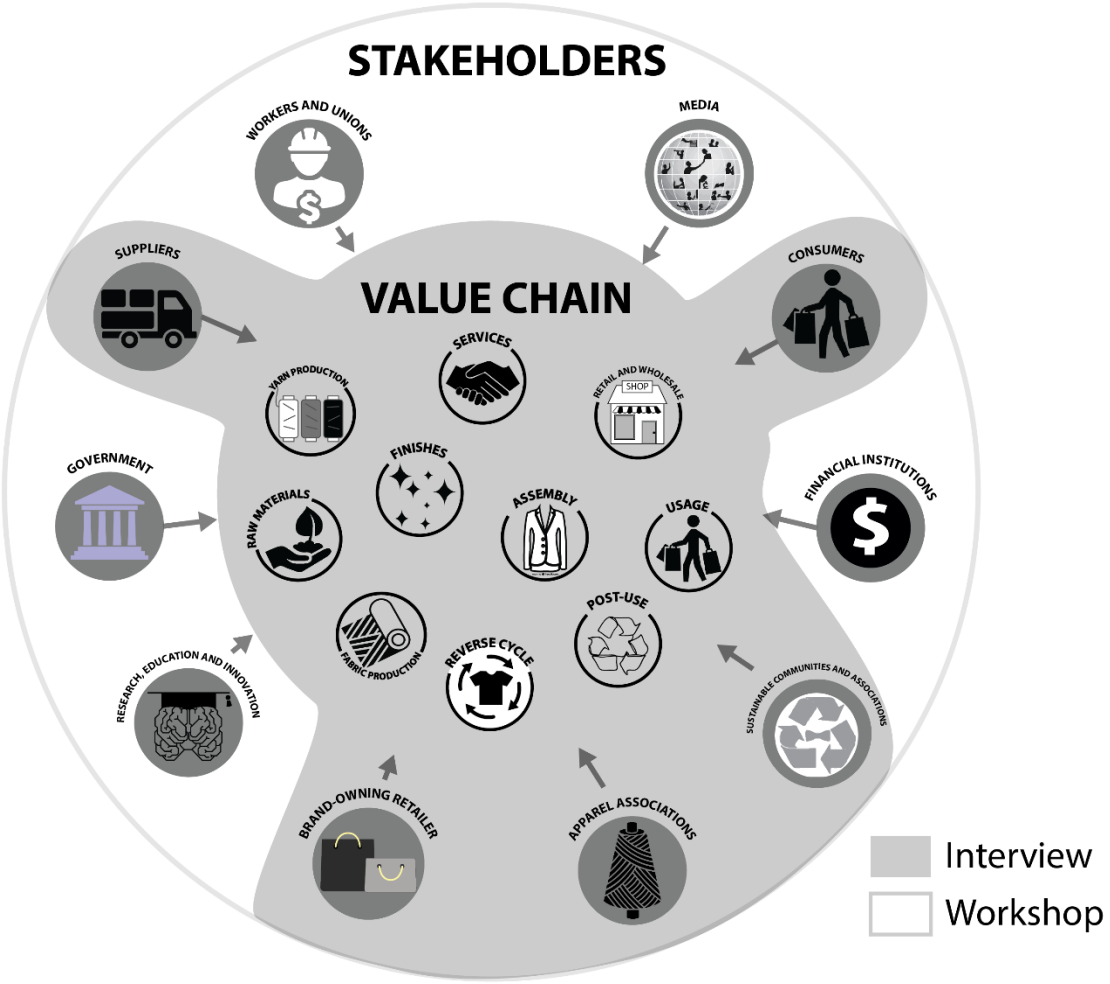


Figure 4: Distribution of the stakeholder groups by method of data collection.

The first workshop took place in São Paulo, on the 31st August 2018, and brought together members of 'Apparel and Sustainable Associations', 'Suppliers', 'Media', and 'Education and Research' groups, focusing mainly on the barriers perceived by the participants for the circular fashion industry in Brazil, and which factors may be required to overcome them.

Separated into small groups, the stakeholders were "supervised" by one facilitator belonging to the research team, working through rounds of discussions based on three topics provided: (1) barriers for circular fashion, (2) niche examples and circular initiatives, and (3) windows of opportunity for a circular transition. Through the facilitators' observations, inputs, and notes, it was possible to guarantee the alignment of the discussion and gather important data, as the participants' perception about the circular economy transition in the textile and apparel sector, which organizations are leading the way, and which are the barriers and enablers for this transition, presented and discussed in the next sections.

With the results gathered during the first workshop in mind, a second workshop was carried out in Rio de Janeiro, on the 9th November 2018, reaching another varied set of stakeholders, groups representing 'Retailers', 'Designers/High-end brands' and 'Financing Agencies' attended, as well as members of 'Textile and Apparel Associations', 'Unions', 'Suppliers', and 'Universities'. The second workshop confirmed the results collected on the previous stages of the research (literature review, desk research, and the first workshop), confirming the Landscape and Regime levels mapped and giving insights to the Niche level (e.g.: brands and circular business models), further exploited by the interviews.

Interviews – Niche level

Considering the stakeholder group division presented in Figure 4, 30 organizations were selected to be interviewed. These stakeholders represented a varied group of small, medium, and large textile and apparel companies based in different areas of the country and different stages of the transition to CE (from curious to fully transitioned).

The semi-structured interviews were carried out between July/2018 and October/2018, by call or electronic mail using open-ended interview questions which were divided into four sections: *Context* (general information on the organization), *Scenario* (which is the company boundaries - where does it start and finish), *Market* (how the organization operates on a daily basis and how it interacts with the other stakeholders) and *Circularity* (information on product/service impact, connections, and windows of opportunity). The information gathered here was used to map the Niche level presented and discussed in the following sections.

The analysis was, then, carried out using a qualitative approach, considering the exploratory nature of the research project. According to Perkins et al. (2018), this approach is mostly used and suitable for 'rich, holistic and complex' inputs, such as the information obtained during the workshops and interviews.

Using the multi-level approach, the research team built a Brazilian textile and apparel industry scenario, considering its deep structural trends, that is, the context for interactions. This Landscape act upon what is called a Regime, sets of routine-based practices, ways of defining and solving problems. Innovations are brought to the picture as Niches, with narrow markets, limited access to technology and infrastructure, and novel business models.

Combining this model with the methodological framework suggested, it is possible to understand the transition pathways and the complexity of these interactions at different spatial and temporal scales. Consequently, we were able to discern which factors, and at which level, represent drawbacks and obstacles (barriers) to a circular transition in the Brazilian textile

industry, to, then, identify the appropriate interventions and windows of opportunity that can assist the different segments of this value chain to overcome the barriers pointed out.

3. Results

3.1. The multi-level perspective

Landscape

The Brazilian economy occupies the 8th place in the ranking of the world's largest economies (IMF 2019). The country's GDP was circa US$ 1.37 trillion in 2020, and its GDP per capita, in 2018, was US$ 6.219 (IBGE 2021b). The services sector represents 70% of Brazil's GDP, whereas the industry sector, which includes the textile and apparel industry, represents 11,8% (Trading Economics 2019).

Although Brazil is a major global producer and one of the largest consumers in international trade (WTO 2019), its participation is still small in textile exports (25th in the World) and even smaller among the apparel exporters (86th) (IEMI 2018). Therefore, Brazil fits the profile of "producer-consumer", that is, produces for itself, with much less significance towards exports.

Despite the Brazilian textile and apparel industry's size (US$ 51,58 billion in revenue, 1,5 million jobs, and 27.500 business), its trade balance is significantly negative (ABIT 2017). The country's textile and apparel businesses suffer from the import of cheaper filaments and clothing. Southeast and East Asian countries, particularly China, have cheaper energy and raw materials, combined with tax incentives and large manufacturing facilities, making them more competitive on prices (ABDI 2010). Figure 5 gathers the data and numbers that illustrate the Brazilian Textile and Apparel industry profile.

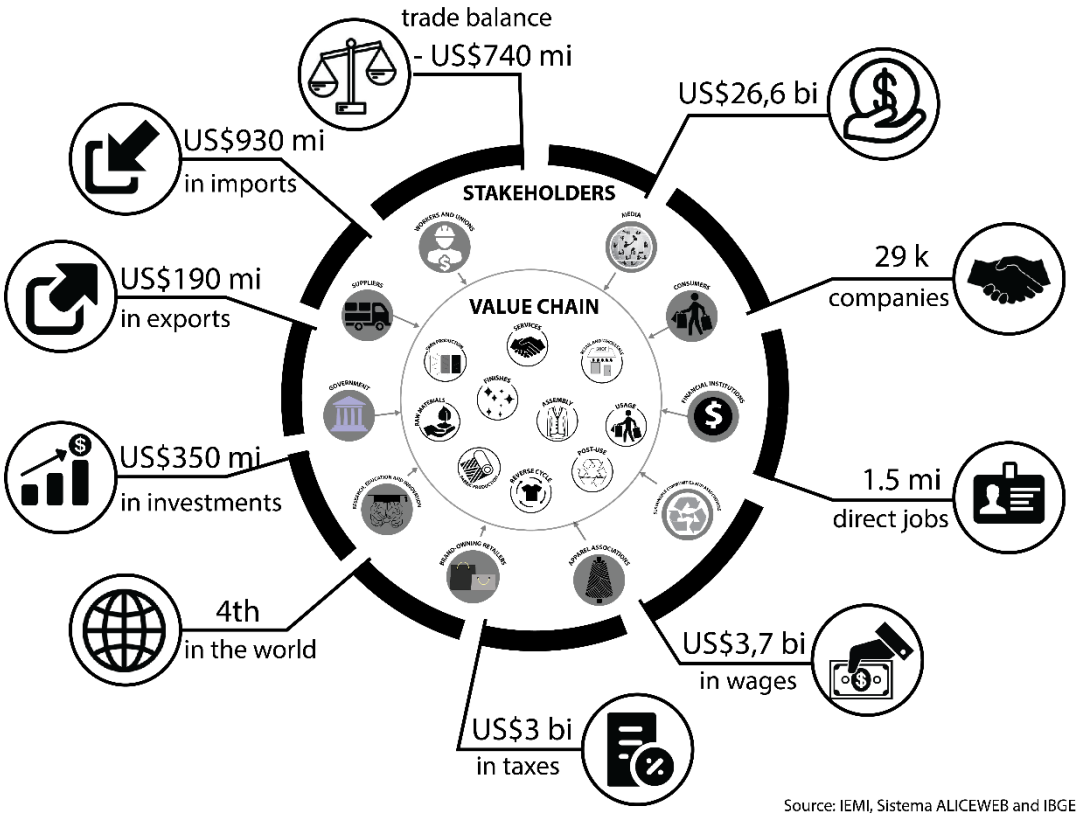


Figure 5: The Brazilian Textile and Apparel profile.

The past 15 years were marked by a significant investment interest of large foreign businesses in buying or creating joint ventures with local Brazilian fashion apparel and retail brands. The best examples include Alpargatas and Marisol Groups.

This business trend, combined with the international business perception of Brazilian brands, mainly denim, beachwear, fitness, shoes, and accessories, contributed to the establishment of several Brazilian small and medium-sized brands worldwide, characterized by their design and style diversity, irreverence, colors, and fitting.

Regime

The Regime analysis provides a thorough and integrated vision of the entire Brazilian textile and apparel value chain, firstly presented in Figure 1. In the country, several types of **raw materials** are produced and consumed by the textile and apparel industries, such as protein-based (silk and wool), cellulose-based (cotton, linen, sisal, etc.), fibers, and filaments, plastic (nylon, polyester, etc.) and non-plastic man-made (viscose) materials (Santana and Wanderley 1998).

The following core link of the value chain is the use of extrusion or spinning processes to **produce yarn**, responsible for massive losses in textile production (up to 50% regarding wool and cotton) (Ishmael et al. 2017). Moreover, few yarn producers in Brazil are located near their

buyers, resulting in large transport emissions and longer production processes (Pimentel et al. 2015).

The yarns or fibers produced are, then, used to create resistant woven, knitted and, non-woven materials. The Brazilian **fabric production** is highly industrialized and responsible for a numerous variety of fabrics, tending to be relatively cleaner and less wasteful than other links of the value chain, such as yarn production and textile finishing (ABIT 2017).

These fabrics, subsequently, go through **finishing** processes: dyeing, printing, UV treatment, among others. These processes can be the most aggressive activity for the environment and surrounding communities, as it is responsible for the use of solvents, dyes, and toxic materials, among others (Claudio 2007). In Brazil, there are more than 20 enterprises focused on finishes across the Southeast region, and it is one of the most regulated categories of the value chain (ABIT 2017).

The following and most fragmented segment of the value chain is the **assembly**, involving processes from product development, to cutting, sewing, and ironing a wide range of garments, which in Brazil employs around 1.2 million people directly and 8 million indirectly in over 26 thousand companies (ABIT 2017). These processes encompass social (poor labor conditions, exploitation of workers, and complete disregard of workers' health), economic (uneven distribution of profits and reinforcement of inequality) and environmental issues (around 25% of a garment's waste is produced during the assembly cutting phase) (Neto and Pita 1996).

Brand-owning retailers, the subsequent core link, commercialize the products with different strategies to approach the market, according to the products' features, availability, and commercialization channel. The main actors in Brazil are very varied, such as multinational and multi-brand retails (e.g., C&A, Renner, Riachuelo), wholesalers in key commercial locations, and well-established designer brands (e.g., Melissa, Havaianas, and Rosa Cha).

The last Regime core link is the **usage**, mainly concerning the relationship between consumer and services providers. Its main hazard is water use, associated with the garment cleansing and disposal, as this is the longest phase of the garment's life cycle (EMF 2017).

Niche

Niches are associated with interests, products, or services which appeal or are available to a small and specific sample of the population. This final level of the scenario analysis gathers key strategic traits of the value chain, that represent crucial cases in Brazil. The circular core links of the value chain (Niches) are specified below.

The **post-use** phase is very particular to the apparel and textile value chains, giving products a second life. This core link encompasses several stakeholders that are neglected by the linear economy model: cooperatives, associations, and clothing collectors, for instance (EMF 2017). These actors are relevant to achieve a sound and grounded sustainable and social development, preventing issues such as the disposal of products and the 'dumping' of goods into illegal waste sites. Brazilian digital platforms such as Enjoei.com and OLX, groups like Recicla Luxo, and numerous small social projects around production regions and districts are good examples of this value chain link.

Services are the most intangible link of the value chain, which can also be seen as the biggest enabler of circularity and an environmentally sound value chain (Amaral et al. 2019). Contrary to other regions, such as Europe and the USA, Brazil has thousands of service providers devoted to repair, refurbish, upcycle, and extend apparels' life cycle, such as seamstress and shoe fixers, which also represent part of the neglected and marginalized stakeholders in the textile and apparel linear economy.

Furthermore, services as rental are emerging as an innovative business model (Mont 2002). Clothes leasing results in a longer product and service life, as well as reduce material use, pollution, and carbon emissions (Feldmann and Kohler 2015). In Brazil, some organizations such as BLIMO, House of Bubbles and, Roupateca have been following this trend.

BLIMO, for instance, functions by charging a monthly fee from its members and granting them unlimited access to the garments in their archive, therefore, this approach increases the lifespan of the garments and allows users to maintain their consumption mindset more sustainably.

The **reverse cycle** link contemplates not only the cycle, goods, and activities which lead to the final product but also how to ensure the material used could be re-inserted into the chain once more (Moreira et al.2015). Considerably more complex than the previous links, this stage requires organization and well-documented records of the activities and goods: two characteristics rarely found within the textile value chain due to its high level of informality and the lack of interest from the various links of the chain.

Additionally, there is the overall impression of high costs and the little perceived addition of the value of recycling materials and products. Several initiatives are being carried out by large manufacturers; however, the deployment of these reverse cycles is affected by the high degree of dispersion of producers, lack of incentives, over-taxation, lack of equipment and facilities suitable for recycling, heterogeneity of the residues, and high costs of collecting the materials.

3.2. Barriers and Windows of Opportunities

Besides gathering the data to build the MLP scenario, during the literature review, workshops, and interviews we also identified which are main barriers for the transition towards a Brazilian circular fashion industry:

- Absence of national programs, incentives, goals, and targets;
- End of pipe regulations, leading to a lack of support from policies and legislation;
- Unhealthy work conditions and societal marginalization during the production, commercialization, and post-use phases;
- Limited technology and low level digital and physical infrastructure;
- Significant losses in production and waste generation;
- Inappropriate ways of textile disposal;
- Cultural inertia and little consumer awareness;
- Lack of applied research towards circularity, communication, information, transparency, and traceability;
- Lack of involvement and collaboration of players in the fashion industry; and,
- Difficulties to make circular products feasible, scalable and valuable.

These results support Stal and Corvellec's (2018) conclusions, who argue that the barriers to adopting CBM in the textile industry are institutional. Whereas firms are operationally capable to retain some product/service value after use, the business logic remains mostly linear (Stal and Corvellec, 2018).

Therefore, for a successful transition to a circular economy and, shifts must happen at the Regime level, promoted by the innovations, ideas, and solutions levered at the Niche level. Windows of opportunity, thus, are the forces that encourage change in the current Regime and endorse circular fashion systems of production and consumption. According to the participants of our workshops and interviewees, the windows of opportunities for a circular textile and apparel industry in this Brazilian scenario are:

- Circular Mindset;
- Collaboration between stakeholders;
- Education;
- Funding and investment;
- Market forces;
- Social awareness;
- Institutional initiatives; and,

- Public policies.

Combining these results, we were able to draw the MLP scenario of the Brazilian textile and apparel industry (Figure 6).

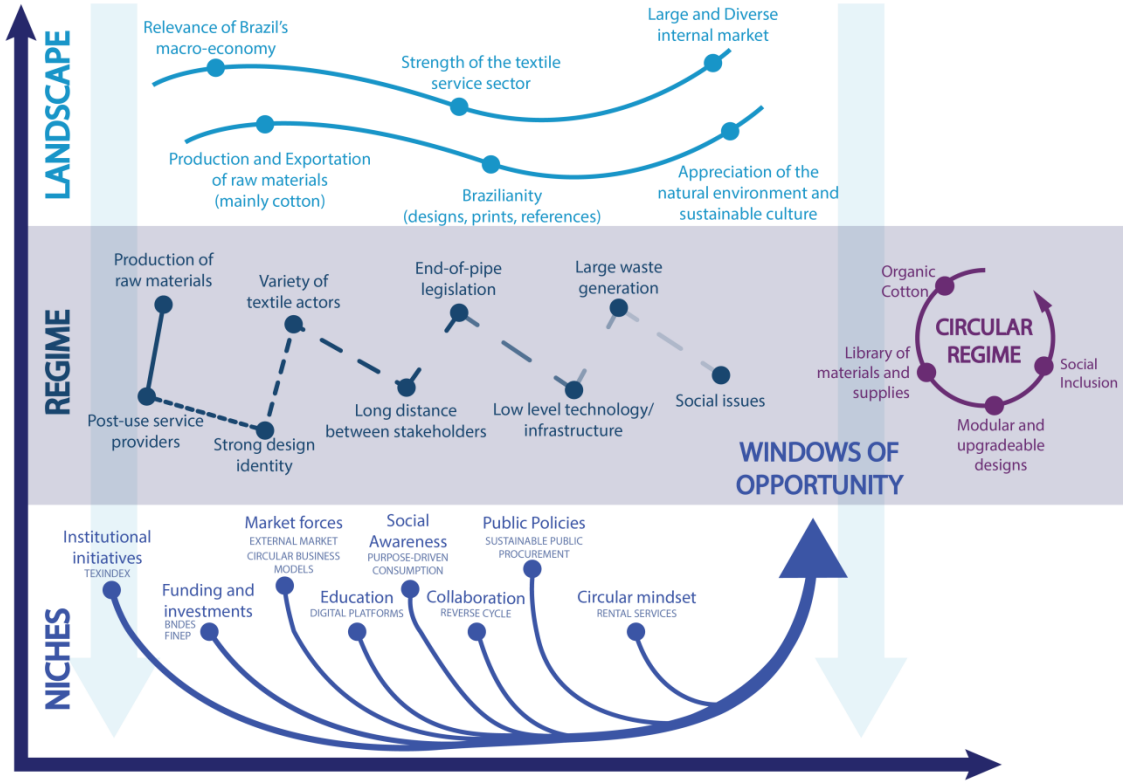


Figure 6: Theoretical contribution (based on Geels, 2002).

The Brazilian fashion scenario comprises a Landscape that highlights the strength of the country's primary and third sector, unique designs, and references, known as 'Brazilianity', and a large and diverse internal market. Concerning the current linear Regime, there are still strong links that reflect the main features of the Landscape, however, factors such as large waste generation, low-level technology/infrastructure, and social issues put this Regime in jeopardy. Therefore, Niches that tackle social awareness, circular mindset, and education, for instance, represent windows of opportunities that arise as a novel and circular Regime, distinguished by organic raw materials, social inclusion, innovative designs, among other aspects.

4. Discussion

According to CNI (2018), the opportunities and benefits regarding the circular transition in Brazil encompass the reduction of resource usage and its costs, the use of more reliable and non-toxic materials, the strength of sectors and value chains, the regularization of informal labor and inclusion of marginalized sectors, multiple and diversified business models, and others.

Concerning the circular textile and apparel industry, Brazil's operating context (Landscape) relies on its macro economy, public policies, legal obligations, politics, and international agreements, providing a background structure for stakeholder interactions.

Moreover, the country's environment and values play an important role in the textile and apparel industries, dictating trends that represent its people's way of living. Designs and brands that embrace Brazilian natural resources and culture, like forestry and fauna references, vivid colors, and bold prints intensify the country's global visibility.

Additionally, the large and diverse internal market, combined with the strength of the textile service sector, set other important Landscape features, as the efficiency of micro and small enterprises as assembly and retails.

However, some of the circular barriers identified during the workshops and interviews can be traced back to this scenarios' Landscape, as the absence of national programs, lack of support from policies and legislations, and cultural inertia. Niche businesses can be easily constrained by existing policy frameworks and face social challenges that combine managing fair practices for workers, facilitating transparent processes of governance, and empowering users in sustainable behaviors, (Real, Lizarralde, and Tyl 2020). Dano, Drabik, and Hanulakova (2020) found that medium-size textile companies in Slovakia have shown positive attitudes regarding CE principles, however, these practices have been mostly motivated by economic intentions and legislative restrictions, two conditions that have not been identified in Brazil.

The behavior/mindset change challenge topic and its consumer interface have also led to valuable research that highlights the lack of effective communication, and consumer awareness, acceptance, and engagement on circular activities (Hvass and Pedersen 2019; Singh et al. 2019). Khan and Rundle-Thiele (2019), for instance, state that those consumers who show high levels of concern about the environment engage in shared clothing usage when they perceive this behavior as economically favorable and the sharing platform as reliable.

Concerning the Regime level, it presents mainstream routines and patterns that enable or constrain business practices. In this work, this level was illustrated through the core links of the textile and apparel value chain. The emphasis of the Brazilian Regime is the exploitation of raw materials and the variety of actors and linear business models.

Other barriers and challenges for a circular textile and apparel sector are rooted in the current linear Regime, as the limited technology and infrastructure, losses in production and waste generation, lack of research towards circularity, and collaboration between players of the fashion sector.

Singh et al. (2019) suggest that the challenges are perceived differently from distinct stakeholders, primarily because of their linear mindset, focusing only on the issues that affect them directly. However, it was found that individual success across the value chain is interdependent on other stakeholders' success, that is, it lacks an understanding of systemic collaboration (Singh et al. 2019). As long specific designs and know-how are preserved, apparel companies show willingness to cooperate to improve processes for all the value chain, stimulating the circular transition of other organizations (Fischer and Pascussi 2017).

The material flow of the circular apparel industry has also gained a lot of attention from researchers. Sandvik and Stubbs (2019) studied the supply chain of textile recycling and state that the need to redirect textiles waste streams, reinforced by legislation and business opportunities, is a key driver of this circular supply chain and is enabled by the access to clothes that would end up in landfills/incineration, the rapid development technologies and design that enhance circularity, and systemic collaboration. Amaral et al. (2018) research found out that the lack of tax incentives and great logistics and transportation costs in countries such as Brazil can equal the recycled and the virgin textile fibers expenses, which hinders textile recycling. Additionally, the absence of and selective waste collection, cost of current sorting practices, lack of stakeholder involvement, technological challenges (separation of blends, separation of additives and trims, restoring quality and sustainability of processes) may result in the loss of tons of textile resources (Amaral et al. 2018; Sandvik and Stubbs 2019).

Moreover, the need for further R&D in the field of new fibers and textiles was also reported by Slovakian companies, especially concerning material quality (Dano, Drabik, and Hanulakova 2020).

Therefore, pursuing the development of a robust business model for sustainable fashion consumption involves key areas, as value proposition and how it develops over time; new channels of profitability; collaboration and a transparent relationship among actors of the value chain; development of capabilities and resources, from new services to innovative technology; knowledge and skills to manage change; increase the efficiency of the business model; and understand the customer behavior and how it needs to be addressed by the company (Hotstrom, Bjellerup, and Eriksson 2019).

The initiatives in Brazil that achieved this circular business model are what we call Niche innovations, as none of them has yet gained scale to be part of the Regime level. According to our interviewees, a matter of lack of market and mindset readiness. Circular innovation is highly attractive for companies, mainly in virtue of its capacity of creating and capturing lost and hidden value for a business, the environment, and society (Konietzko, Bocken, and Hultink 2020).

The major part of the fashion supply chain is composed of small and medium enterprises, with a lack of resources, limited management capabilities, and financial resources, which is why innovations must be levered by windows of opportunity, forces that encourage change in the current Regime, as the promotion of circular fashion systems of production and consumption.

A **circular mindset**, the positioning from which individuals act and express themselves (Dweck, 2017) towards circular products and services, merges the awareness and nuisance of the ineffectiveness of the current fashion industry Regime and the desire to solve a problem through a cost-effective and innovative solution, providing a bottom line to understand the necessity of change in people's decision-making process (Calvo-Porral and Levy-Mangin 2020; Camacho-Otero, Boks, and Pettersen 2019).

Therefore, a circular mindset can guarantee the awareness of value to be captured across a product chain (Zacho et al. 2018) and the involvement of consumers in sharing-based business models (Barbu et al. 2018). Niches that incorporate new business models, such as rental services (e.g.: BLIMO), upgradable and modular designs (e.g.: DePloy[3]), and recycled products (e.g.: Ahlma) depend on this window of opportunity to gain scale and relevance.

Collaboration between stakeholders is another emerging feature that can address several barriers to the current Brazilian fashion Regime (e.g., lack of financial resources and capabilities, lack of reverse supply chain, outdated technologies, and infrastructure). One of the major challenges for start-ups is to gain traction. On the other hand, large companies struggle to change their business model to a circular one (Amaral et al. 2019).

Hence, the collaboration between the Regime and Niche players needs to be leveraged, creating environments that encourage disruptive innovations, as resource usage ('waste' as raw material, reverse cycles, libraries of materials across companies) and inclusion of marginalized actors (cooperatives and clothing collectors).

Additionally, the collaboration between research centers, universities, and companies can promote sustainable technologies to the Regime and support a major part of the fashion value chain to build the basis for the CE practices. Moreover, collaborative initiatives involving multi-stakeholders have the potential to address challenges like the lack of public policies focusing on CE, double taxation of the use of waste as raw material, lack of incentive to use more sustainable materials. Currently, few initiatives engage and stimulate collaboration between government, society, and companies.

[3] As no Brazilian apparel brand has been identified to operate within this circular business model, we provided a British example.

Another window of opportunity is **education,** in terms of environmental awareness and formal education. It can contribute to the mindset change and, also, to the development of required skills for practitioners to implement circular solutions. This drives the promotion of Niches that tackles poor infrastructure (digital platforms), limited technology (recycling of heterogeneous materials), and consumer awareness (social inclusion), among others. Academically, the circular economy has been addressed by a few universities in Brazil. Our desk research and workshop results showed that current Brazilian fashion-related undergraduate programs address sustainability, but not CE.

The difficulty of leveraging Niche innovations is also reflected by financial issues; therefore, **funding and investments** represent crucial opportunities. Resources for circular solutions in Brazil are still scarce (Amaral et al. 2019). Key stakeholders such as the BNDES (National Bank of Economic and Social Development) and FINEP (Innovation and Research Financial Agency) are only starting to address these opportunities.

Alternatively, there are some accelerator programs, such as Fashion for Good and SmartX, which focus on sustainable business and investing in social business start-ups but do not yet address assumptions and principles of circular economy in their investment assessments.

The Brazilian market, despite being enormous, has shown signs that do not successfully explore sustainable products. As we previously discussed, start-ups and small businesses dealing with these Niches struggle to scale and reach the Regime market, while large companies face difficulties to change their current linear business model.

Thus, **market forces** can also be presented as opportunities to change the linear scenario. New Circular Business Models have been launched and successfully reach specific markets (Konietzko, Bocken, and Hultink 2020). Moreover, the external market could be an interesting alternative to promote sustainable products while the internal market is under development. Some start-ups validated their business model and operations in Brazil, and now are planning to expand their business abroad.

Social awareness is another window of opportunity, especially regarding social issues, such as fair labor conditions. So, companies should expect increasing societal pressure for sustainable products and should communicate their results to attract consumers towards the circular economy.

The adoption of CE principles and practices by the fashion industry can also be promoted through **institutional initiatives**, developed by non-profit organizations, research centers, and universities. The TexIndex Brasil is a good example of how an association can disseminate the importance of sustainability. Supported by APEX and ABIT, Texindex helps companies that are

constrained and lacking resources to invest in the circular economy. By using the Texindex[4] tool, a free and open-source platform, companies can assess their maturity level on sustainable practices and develop a roadmap, which can be useful for small and medium enterprises.

Additionally, the Fashion Revolution's transparency index[5] is another initiative that contributes to the CE principles. In 2017, The Fashion Transparency Index 2017 reviewed and ranked 100 of the biggest global fashion and apparel brands and retailers according to how much information they disclose about their suppliers, supply chain policies and practices, as well as social and environmental impact.

Moreover, **public policies** that are designed beyond compliance and towards innovation, influence positive and proactive business practices (Mont and Lindhqvist 2003). Sustainable public procurement, for instance, has a huge potential to leverage a circular fashion industry by stimulating and pushing companies to adopt circular economy strategies, once they should attend the circular requirements to win government contracts and grants. To conclude, through the multi-level perspective, we could identify the main barriers for the transition towards a circular fashion industry in Brazil as limited technology and infrastructure, little consumer awareness, lack of national and regional programs, targets, and legislation. On the other hand, we also identified the windows of opportunities that lever this transition (Figure 7).

Figure 7: Opportunities for CE in Brazil.

[4] https://www.texindexbrasil.com.br/
[5] https://www.fashionrevolution.org/about/transparency/

5. Conclusion

To fully move towards the circular economy, it is necessary to reconfigure societal systems, that can be achieved through innovations across a wide range of sectors, which includes not only the development of new technologies, but also of novel social practices and business models, changing the mindset, beliefs, and core values.

This research focused on the circular transition of the Brazilian textile and apparel value chain, which is complex and extensive. Although representatives of the main stakeholder groups participated in the workshops and interviews, it was not feasible to include members of the value chain across the whole country. Thus, the scenario here portraited is limited to a general idea of the Brazilian textile and apparel industry and may not represent the reality of some core links that operate outside the Southeast and South regions.

Nonetheless, this work identified the challenges to be overcome by the Brazilian textile and apparel industry in the circular transition, which include legislation and financial incentives that still promote linear business models, weak structural and operational production systems (including technical and technological aspects), logistics, waste collection, fragilities in the education and training programs, bureaucracy, and cultural behavior.

Following the systemic perspective approached by this work, the transition to a circular economy should go beyond a top-down approach at Landscape level, that is mainly driven by policies and media, but also leverage a bottom-up approach, in which innovative cases from the Niche level can achieve and contribute to the Regime layer.

Consequently, a recommendation for a circular textile and apparel industry is the encouragement of a range of bottom-up initiatives and top-down policy strategies, as well as communication and collaboration among stakeholders, especially in the initial stages when there are several barriers to overcome.

Moreover, a prerequisite for this circular transition is the shift of individual mindset. Cultural changes take place in the long run and can be leveraged, for instance, by education. A special focus should be invested on designers, marketers, engineers, top managers, and CEOs, with practical and problem-solving oriented courses to fit the learning style of the Brazilian professional.

The barriers and windows of opportunity presented here provide generalizable data for other developing nations considering the transition towards a circular economy and migrating from a commodities-based economy to a socio-technological circular system. Future research

includes understanding the role of the consumer/user in this circular apparel industry, as well as the orchestration and operation of circular textile business ecosystems.

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The establishment of metrics on circular consumer behaviour: an application in the apparel industry

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Abstract

By satisfying the human need of clothing oneself, the garment industry influences traditions and lifestyles, having a crucial role in socio-cultural, political and economic dimensions. However, this industry is also responsible for extensive social and environmental impacts, including intensive throw-away practices. Circular Economy, as a disruptive economic model, presents solutions based on new circular business models that prevent such negative impacts, and intends to generate positive influences in society and the natural environment. This research combines Environmental Psychology and Circular Economy theories in the context of the apparel industry. Specifically, we study which factors influence pro-circular fashion behaviours. Aiming to address this objective, we developed a survey concerning circular business models in the apparel industry. Hence, this research addresses the consolidation of a questionnaire, applied among Brazilian and Dutch apparel consumers, including its theoretical reasoning and the definition of environmental and psychological indicators. Thus, it introduces a systematic approach to data gathering among circular consumers/users, such as patterns of consumption, consumers' understanding of environmental issues and its impact on decision making, their values, beliefs, contextual factors, as well as social norms.

Keywords: circular economy; environmental psychology; consumer behaviour; apparel industry

Introduction

The Circular Economy (CE) represents a disruption of the linear 'take – make – dispose' production/consumption model (WEF, 2014). The most common approach when defining CE is

its focus on material, resource flow and waste management (Blomsma & Brennan, 2017; Geng & Doberstein, 2008; Haas et al., 2015), however, some authors also highlight the importance of product design, generating positive impact on the environment and society (EMF, 2017b; Murray, Skene & Haynes, 2017; Webster, 2015). According to Prieto-Sandoval, Jaca and Ormazabal. (2018), the CE presents a shift on how society and nature interconnect, aiming at a sustainable development at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels. The authors also state that this circular approach challenges the way society legislates, produces and consumes. These challenges are particularly latent at the apparel industry.

The apparel sector is responsible for many negative impacts on the environment – pollution footprint, use of solvents and dyes, energy-intensive processes, etc. – and to society – lack of infrastructure, absence of employment contracts, unhealthy work environment, etc. (Claudio, 2007; EMF, 2017a; Hobson, 2013; Keane & te Velde, 2008). Additionally, the fast fashion industry stimulates frequent purchases and the premature disposal of goods, which is encouraged by the overflow of new trends and the desire of change, perpetuating short products' life cycles (Armstrong, Kang & Lang, 2018).

Unquestionably, a transition towards a circular economy in the apparel industry demands a holistic change, involving complex factors such as new business models, new designs of value creation and co-creation, and, most important, behavioural shifts.

In order to support behaviour change towards CE, we first need to understand which factors influence pro-circular behaviour. Taking into account the importance of consumers' driving force to promote change and magnify circular initiatives (Geng, Sarkis & Bleischwitz, 2019), the present research aims to present the development of a questionnaire, to test to what extent consumers engage in circular apparel behaviours as well as to test which factors influence these behaviours.

Environmental Psychology

The interest and research on the interaction between human behaviour and the natural environment date from the beginning of the 1970s and is called Environmental Psychology (Stokols, 1978). This area of psychology studies both the influence of the environment on people and the influence of people on the environment, the latter being the focus of this research. That is, behaviours that modify the availability of resources and energy and change the structure and dynamics of ecosystems or the biosphere (Stern, 2000).

Many studies have been developed in this area involving environmentally relevant and urgent matters, such as energy (Pichert & Katsikopoulos, 2008), mobility (Hunecke et al., 2007), and climate change (van Lange, Joiireman & Milinski, 2018). Important models and approaches in the field of environmental psychology are the Theory of Planned Behaviour (TPB, Ajzen, 1991), the Norm-Activation-Model (NAM, Schwartz & Howard, 1981), and the Value-Belief-Norm Theory (VBN, Stern et al., 1999) (Klöckner, 2013).

Methodology

This research's main goal was to develop a tool that identifies factors that influence or determine consumer behaviour towards circular offerings. The combination of the three theories, TPB, NAM and VBN, resulted in the set of factors that guided a survey's development. Survey is a pertinent methodology to communicate with consumers and users, investigate their opinions and to obtain information on users' internal factors, such as values and personal norms, as well as contextual factors (Daae & Boks, 2015).

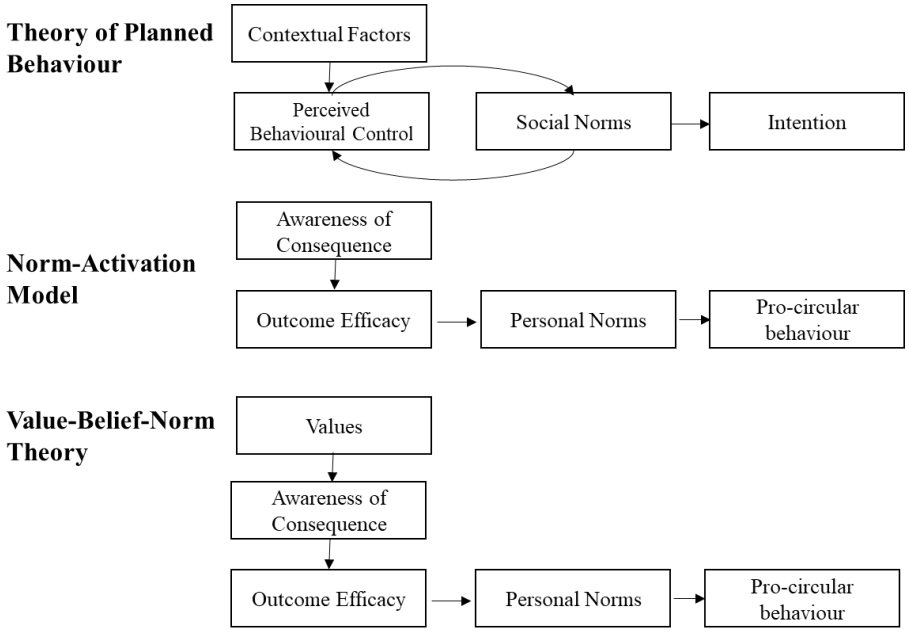
The Theory of Planned Behaviour (TPB) was postulated to explain and predict behaviour in specific contexts, using an individual's intention to perform a given behaviour as a central factor (Ajzen, 1991). *Intention* represents the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour (Warshaw & Davis, 1985). The TPB proposes that behaviour is influenced directly and indirectly via intention by *perceived behavioural control*. Perceived behavioural control reflects the individual's perception of the ease or difficulty of performing a certain behaviour of interest (Ajzen, 1991). Perceived behavioural control may be influenced by contextual factors such as availability, convenience and price. *Social norms* represent patterns of behaviour that are self-enforcing within a group (Young, 2015).

The Norm Activation Model (NAM) explains altruistic and environmentally friendly behaviour (Onwezen, Antonides & Bartels, 2013). The model states that behaviour is influenced by personal norms which are experienced as feelings of a moral obligation to perform a certain behaviour (Schwartz, 1977; Schwartz & Howard, 1981). Personal norms are influenced by *Outcome efficacy*, which reflects to which extent an individual feels they contribute to reducing the environmental problem by changing their behaviour (Schwartz, 1977). Outcome efficacy is influenced by *awareness of consequence* which indicates the knowledge and perception of the environmental problems caused by a particular behaviour (van der Werff & Steg, 2015).

Value-Belief-Norm theory (VBN), on its turn, proposes that factors such as values and environmental concern affect behaviour variables like awareness of consequences, outcome efficacy and personal norm (van der Werff & Steg, 2016). The more one values protecting others and the environment, that is, the stronger one's biospheric and altruistic values, and the less one cares about protecting your own resources and consume goods for luxury purposes, that is, weaker one's egoistic and hedonic values, the stronger the environmental concern (van der Werff & Steg, 2016). Additionally, we considered materialistic values, that measure the centrality of acquisition-related activities in a person's life and how they prioritize possessions over other things in life (Richins & Dawson, 1992), as we believe they are likely to be relevant for pro-circular behaviour. Specifically, the stronger one's materialistic values the weaker one's awareness of consequence and the less likely it is that someone engages in circular behaviour.

Summarising, according to the TPB model, individuals weight the benefits and the costs of a behaviour; on the other hand, moral aspects, like values and norms, are investigated to influence behaviours by the Norm-Activation Model and Value-Belief Norm Theory, see Figure 1. These three models have been successfully related to pro-circular behaviours, such as recycling (Geiger et al., 2019).

Figure 1: Illustration of the TPB, NAM and VBN Theory (adapted from Ajzen, 1991; Schwartz & Howard, 1981; and van der Werff & Steg, 2016).



According to Muranko et al. (2018), pro-circular behaviours are those resulted from prioritising resource efficiency and benefits or at least reduce damages to the environment, economy and

society. In this study, we considered circular behaviours from apparel consumers related to product life extension. These behaviours include acceptance and adoption of circular products, as garments designed to be durable for a long time, and repaired, modular, remanufactured, reconditioned and upgradable apparel. We focused on behaviours that affect garment's life cycle extension, as the fast fashion industry stimulates frequent purchases and the premature disposal of goods (Armstrong, Kang & Lang, 2018).

Results and Discussion

The measurements of each factor used in the research is presented ahead according to which theory or model it relates to.

Theory of Planned Behaviour

TPB is formed by three internal factors and three contextual factors. The contextual factors are availability, price and convenience and they were measured according to the perception of the respondent. That is, each respondent had to indicate to what extent they agreed or disagreed with statements that assess if a circular product is easy to find, is accessible or not and convenient, using terms like 'life-style' and 'fashionable'.

These three contextual factors may influence one's perceived behavioural control, how they realise if consuming a circular product is in their control, which was stated as 'it is up to me'. Social norms, on its turn, were measured by the perception of obligation, moral obligation and compel that society collectively has to prevent social and environmental harm caused by the textile industry. Also measuring social norms, we questioned if the respondent thinks that a typical citizen of their country would feel moral obligated and proud to consume a circular product or would feel guilt for not doing so. The final factor is intention, that is, the respondent's willingness to acquire or even pay more for a circular product (Table 1 gives examples of the statements presented to the participants regarding TPB's factors).

Table 1: TPB's factors and examples (direct related to durable products) of measurements.

Factor	Statements to which respondent had to indicate to what extent they agreed or disagreed with
Availability	Clothes and footwear with longer life cycles are easily available
Price	Clothes and footwear with longer life cycles are more expensive than regular clothes and footwear
Convenience	Clothes and footwear with longer life cycles are less fashionable than regular clothes and footwear
	Clothes and footwear with longer life cycle match my life-style
Perceived behavioural control	Consuming clothes and footwear with longer life cycles is up to me
Social norms	We are morally obligated to prevent social and environmental harm caused by the textile industry
	We are morally compelled to act to prevent social and environmental harm caused by the textile industry
	We are not obliged to do something to stop social and environmental harm in the textile industry*
	A typical citizen from your country would feel morally obligated to consume clothes and footwear that have a longer life cycle
	A typical citizen from your country would feel guilty if they did not consume clothes and footwear that have a longer life cycle
	A typical citizen from your country would feel proud if they would consume clothes and footwear that have a longer life cycle
Intention	I am willing to acquire less pieces of garments (clothes and footwear) if they have a longer life cycle
	I am willing to pay a higher price if garments (clothes and footwear) have a longer life cycle

* Reverse scored item

Norm-Activation-Model and Value-Belief-Norm Theory

NAM and VBN Theory have several three factors in common. The first one is awareness of consequence, which is the awareness individual have that certain practices, such as fast-fashion, cause problems for society and the environment, as well as how worried this individual gets about the studied practice. The second factor is outcome efficacy, which measure the extent to which one person is willing to change their behaviour in other to reduce social and environmental problems.

The last and third factor shared by NAM and VBN Theory is personal norms, which are similar to social norms, however, we investigate one's own perception of obligation, moral obligation and compel to prevent social and environmental harm caused by the textile industry, as well as their feelings of moral obligation and proud to consume a circular product and guilt for not doing so (Table 2 gives examples of the statements presented to the participants regarding shared NAM's and VBN's factors. All statements direct related to repaired/reconditioned product examples).

Table 2: NAM's and VBN's shared factors and examples of measurements.

Factor	Statements to which respondent had to indicate to what extent they agreed or disagreed with
Awareness of consequence	The production and consumption of fast-fashion causes important problems for society
	The production and consumption of fast-fashion cause serious environmental issues
	I worry about the social and environmental impacts caused by the clothing/fashion industry
Outcome efficacy	If I would reduce my consumption of fast-fashion I would contribute to reducing social and environmental problems caused by fast-fashion.
	I think that to repair and extend the usability of my clothes and footwear is effective to reduce social and environmental harm in the textile industry
	I think I can contribute to reducing social and environmental problems by repairing and extending the usability of my clothes

Personal norms	I feel morally obligated to prevent social and environmental harm caused by the textile industry
	I feel morally compelled to act to prevent social and environmental harm caused by the textile industry
	I don't feel obliged to do something to stop social and environmental harm in the textile industry
	I feel morally obligated to repair and extend the usability of my clothes and footwear
	I would feel guilty if I did not repair and extend the usability of my clothes and footwear
	I would feel proud if I would repair and extend the usability of my clothes and footwear

Value-Belief-Norm Theory

Besides the measurements of awareness of consequence, outcome efficacy and personal norms, we also measured values for the VBN Theory. Biospheric values are translated to if a person respects the earth, protects the environment, prevents pollution and feels united with nature; altruistic values evaluate the importance of equality, peace, social justice and assistance; egoistic values, how much one values social power, wealth, authority, influence and ambition; and hedonic values, the importance of pleasure, enjoying life and self-indulgence. Materialistic values (Richins' & Dawson's, 1992) are divided into success, how much one person measures its own and others' success based on possessions, the centrality of acquisition-related activities in a person's life and the relationship of happiness and material ownership (Table 3).

With exception of the Biospheric, Altruistic, Egoistic and Hedonic value, which were classified between -1 (opposed to my values) to 7 (of extreme importance) by each respondent, the other factors were measured using 5-points Likert Scale, so the participants had to choose from strongly disagree (1) to strongly agree (5) to declare how they felt about the statements.

Table 3: Measuring Biospheric, Altruistic, Egoistic, Hedonic and Materialistic Values.

Values		Items
Biospheric		Respecting the earth: harmony with other species
		Unity with nature: fitting into nature
		Protecting the environment: preserving nature
		Preventing pollution: protecting natural resources
Altruistic		Equality: equal opportunity for all
		A world at peace: free of war and conflict
		Social justice: correcting injustice, care for the weak
		Helpful: working for the welfare of others
Egoistic		Social power: control over others, dominance
		Authority: the right to lead or command
		Influential: having an impact on people and events
		Ambitious: hard-working, aspiring
Hedonic		Pleasure: joy, gratification of desires
		Enjoying life: enjoying food, sex, leisure, etc.
		Self-indulgent: doing pleasant things
Materialistic	**Success**	I admire people who own expensive homes, cars, and clothes
		The things I own say a lot about how well I'm doing in life
		I like to own things that impress people
	Centrality	I try to keep my life simple, as far as possessions are concerned*
		I enjoy spending money on things that aren't practical
		I like a lot of luxury in my life
	Happiness	My life would be better if I owned certain things I don't have
		I'd be happier if I could afford to buy more things
		It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like

* Reverse scored item

Besides these specific factors, we also collected information about consumption habits, as the number of pieces of clothes acquired per year, an average garment's use-time (in months), and the importance consumers give to brands, durability, sustainability, among others, when buying clothes. Concluding the questionnaire, we addressed demographic info, such as gender, age, income and nationality, which will allow us to stratify our results and verify if any of these variables also influence the acceptance and adoption of pro-circular behaviour.

Conclusions and Future Work

This research presented the importance of consumer behaviour on the acceptance and adoption of circular offerings, especially in the apparel industry. It also provides, by giving an example of the authors' survey development, a structured approach, based on Environmental Psychology theoretical frameworks (TPB, NAM and VBN Theory), to map variable that can influence pro-circular behaviour.

The next steps of this research comprise the models' testing, measuring the factors' statistical significance and influence on the pro-circular behaviour, using the responses being collected among Brazilian and Dutch apparel consumers. Following, we will develop a roadmap to boost the consumers' circular mindset emergence in the clothing industry.

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Role of consumer mindsets, behaviour, and influencing factors in circular consumption systems: A systematic review

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Abstract

The transition to a circular economy presents new ways to create and offer value by proposing changes to current production and consumption systems. This study focuses on the challenges concerning consumers' acceptance of circular offerings and their engagement with the circular economy. Through a systematic literature review, we investigated consumers' mindsets, behaviour, and influencing factors, and positioned them in circular consumption systems. This review was conducted using two databases, Scopus and Web of Science, in January 2020 and updated in September 2020. A total of 107 articles were screened, and 53 were included in the analysis. We mapped 6 circular mindsets, 14 circular behaviours, and 54 factors that influenced them. Our results show that broad interpretations and generalisations concerning these elements should be carried out carefully, as they are highly contextually driven. However, their role in consumption systems is clear. Consumers' mindsets are the starting point of circular consumption systems, as they present pre-dispositions in engaging with circular offerings. These mindsets are expressed by consumer behaviour, which allows product flow in these systems; they, in turn, are affected by influencing factors. We suggest that continued updates on this systematic literature review should be conducted, along with the development of a structured tool to help organisations engage their consumers by developing circular mindsets and encouraging circular behaviour, using the influencing factors.

Keywords: circular economy, behavior change, consumer, circular business models, circular consumption system.

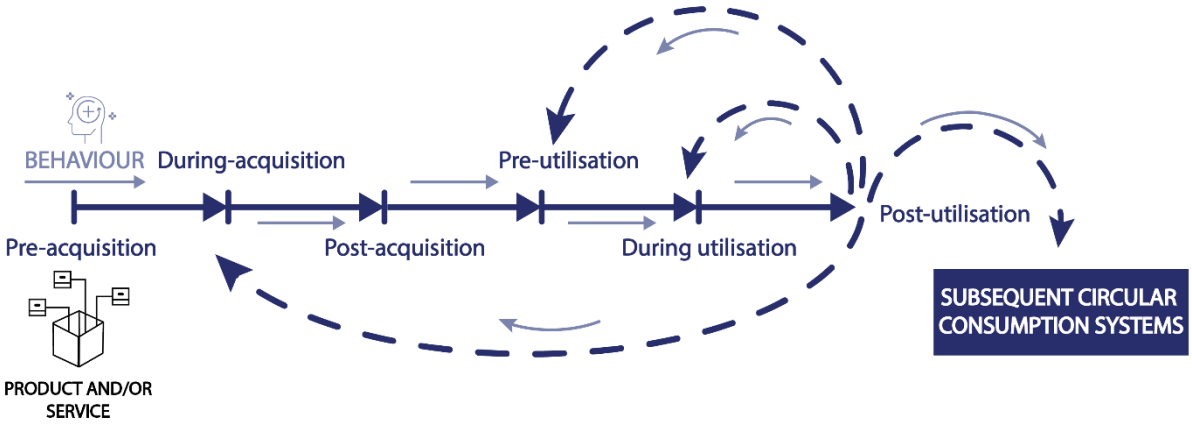
1. Introduction

Consumption systems represent a set of activities, decisions, and behaviours that comprise the acquisition and usage of products and services to meet customers' needs (Sun et al., 2016; Woodside; Bubelaar, 2002). Such systems consist of structural elements, the products and/or services offered, transactional processes, the stages of acquisition, and post-acquisition activities that are part of the customer experience (Lebel and Lorek, 2010; Sun et al., 2016).

The set of consumers' activities, decisions, and behaviour following the principles of the circular economy (CE) is called a circular consumption system. CE is an economic model that proposes an alternative to the linear pattern of production and consumption, take-make-dispose. CE is a complex concept (Blomsma and Brennan, 2017; Prieto-Sandoval et al., 2018) that aims to achieve sustainable development (Murray et al., 2017; Ritzén; Sandström, 2017), which comprises a multi-level and holistic approach (Geissdoerfer et al., 2017; Prieto-Sandoval et al., 2018), disruptive innovation (BSI, 2017; Park et al., 2010), and minimisation of resource demand (EMF, 2017; Ghisellini et al., 2016; Haas et al., 2015).

Circular consumption systems (Figure 1), therefore, represent the systems in which consumers meet their needs through circular transactional processes: the acquisition, use, and post-use of circular products and services. Muranko et al. (2020) describe these circular transaction processes as behavioural chains, the sequence of unique and consecutive actions performed throughout the consumption of a circular offering.

Figure 1: Circular consumption systems



Source: Adapted from Muranko et al. (2020).

Challenges concerning the acceptance and consumption of circular products have been highlighted in the CE literature (Camacho-Otero et al., 2018; Kirchherr et al., 2017), and the success of circular initiatives has been associated with consumers' predispositions and the

likelihood to behave according to CE's goals (Daae et al., 2018). However, to the best of our knowledge, no comprehensive investigation of circular consumption systems has been conducted in the CE field. Thus, we examine, through a systematic literature review, the role of mindsets and behaviour, and their influencing factors in circular consumption systems.

Circular mind-sets are presented by the Circular Design Guide (EMF, 2018) as the changes that must occur in design thinking to both bring elements of circularity in offerings and leverage the CE through these offerings. The circular organisational mindset, in turn, is defined as the assumptions and beliefs that determine how an organisation interprets and responds to situations (Bertassini et al., 2021). An individual's mindset is the position from which people act and express themselves (Dweck, 2017). Consequently, we propose that a circular consumer mindset is the belief and pre-disposition of the consumer when engaging with circular products or services. However, the mindset of circular consumers has not yet been mapped. Therefore, the first goal of this study is to identify consumers' mindsets in CE literature.

Muranko et al. (2018) define (pro)circular behaviour as the behaviour which results from prioritising resource efficiency, and benefits, or at least reduces, damage to the environment, economy, and society. Thus, circular consumer behaviour is one that promotes resource efficiency, as well as the flow of circular value, in consumption systems. The second goal of this study is to identify consumers' behaviour addressed in the CE literature.

Circular behaviour is not always entrenched in people's consumption patterns, as circular solutions depend on overcoming cultural barriers (Campbell-Johnston et al., 2019). Therefore, the CE transition implies behavioural changes (Botelho et al., 2016) and an understanding of all that circular consumption entails (Calvo-Porral; Levy-Mangin, 2020). Accordingly, the third objective of this study is to identify the factors that influence, hinder, and boost customer engagement in circular consumption systems.

Finally, we propose a framework that presents the role of consumers' circular mindsets, behaviour, and influencing factors in circular consumption systems, and the way these concepts interrelate.

2. Methodology

A systematic literature review (SLR) was chosen to summarise the existing evidence on circular consumption. Our preliminary investigation on the theme showed that there are gaps in the CE literature concerning consumers' mindsets, behaviour, and influencing factors in circular consumption systems, which we address with the following research objectives:

iii. Identify consumers' mind-sets in the CE literature;
iv. Identify consumers' behaviour addressed by the CE literature;
v. Identify the factors that influence, hinder, or boost customer engagement in circular consumption systems.

This SLR was undertaken based on the guidelines proposed by Kitchenham (2004) and Conforto et al. (2011) and revised and reported as per the PRISMA 2020 guidelines (Page et al., 2021), including only articles published in peer-reviewed journals in English. There were no restrictions concerning the studies' year of publication or data collection, field of publication or circular business model, or applied methodology. Based on these eligibility criteria, we conducted electronic searches of two databases, Scopus and Web of Science, on 21 January 2020. The search was updated on 29 September, 2020. The search strings were as follows:

- Scopus
    - TITLE-ABS-KEY ("circular economy" AND "mindset") AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
    - TITLE-ABS-KEY ("circular economy" AND "consumer behavio*r") AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
    - TITLE-ABS-KEY ("circular economy" AND "consumer acceptance" AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
    - TITLE-ABS-KEY ("circular economy" AND "behavio* change" AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")).
- Web of Science
    - TS = ("circular economy" AND "mindset");
    - TS = ("circular economy" AND "consumer behavio*r");
    - TS = ("circular economy" AND "consumer acceptance");
    - TS = ("circular economy" AND "behavio* change").

The selection process, conducted by the main author of this study, was conducted according to the iterative process suggested by Conforto et al. (2011), which included three filters: the first filter analyses the title, abstract, and keywords; the second filter is the introduction and conclusion; and the third filter considers the whole document. As these three phases are significantly different sections of the documents, each filter has a specific inclusion criterion:

- First filter: the article must include the themes of circular economy and mind-set or behaviour.

- Second filter: the article must approach the behaviour or behaviour change of consumers when facing circular offerings.
- Third filter: the article had to attend to at least one of this research's objectives: present consumers' circular mindsets, behaviour, and/or influencing factors.

Subsequently, we developed a standardised data collection sheet to compile relevant data from the articles. The collection sheet contained the following information: authors, title, journal, year, DOI (Digital Object Identifier), circular mind-sets, circular behaviour, and factors influencing circular behaviour. If the article presented a case study, the following data were also collected: circular business model, location of case study, and type of product studied. Eligible outcomes were categorised as follows:

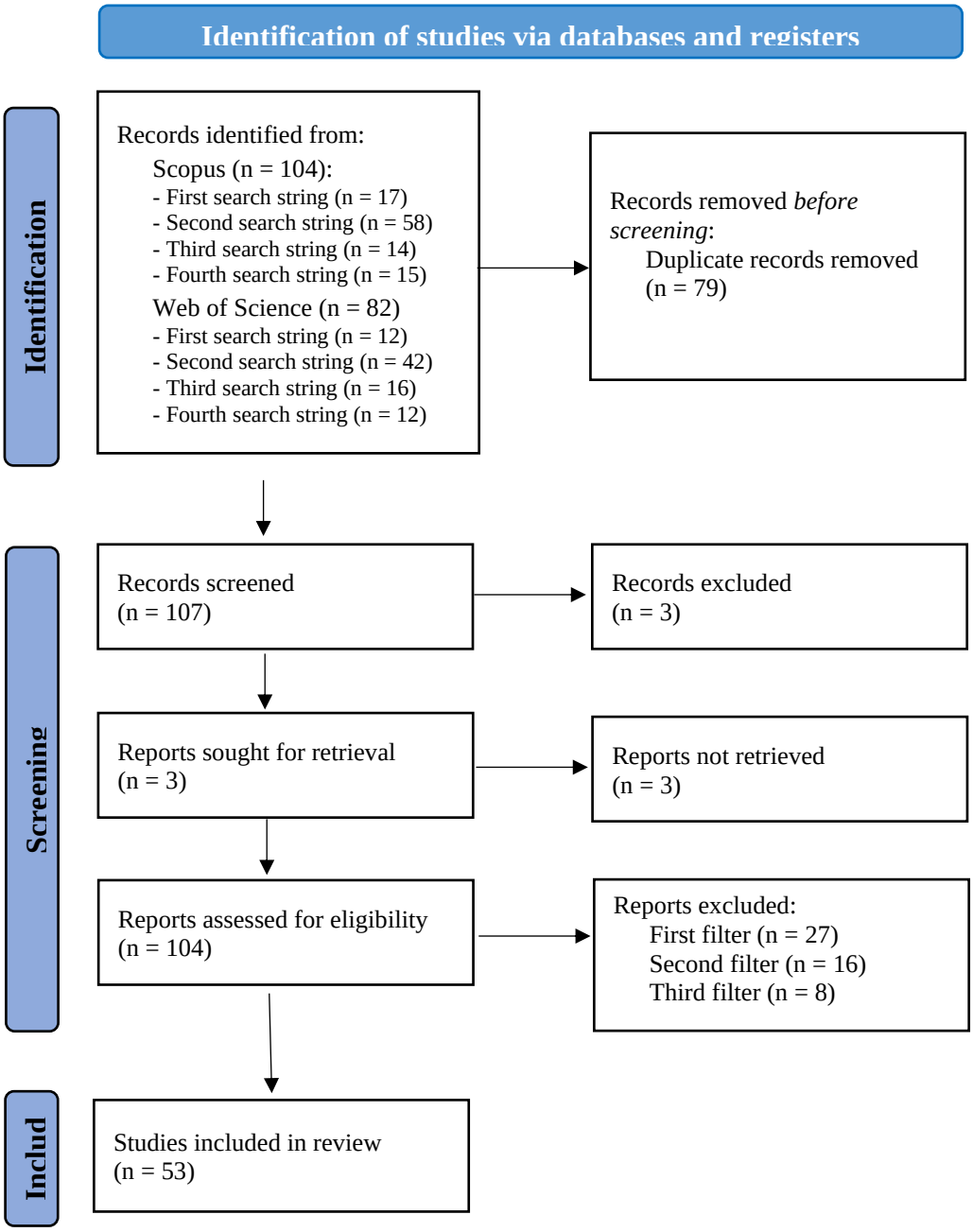
- Circular mind-sets;
- Circular behaviour;
- Influencing factors:
    - Political and legal;
    - Economic;
    - Environmental;
    - Demographic;
    - Consumer related;
    - Product/Service offer;
    - Product/Service related.

Finally, to address our fourth objective, we analysed the data gathered during this SLR to develop a framework on how circular mindsets, behaviour, and influencing factors are interrelated, and their role in circular consumption systems. We developed a collaborative framework and discrepancies were resolved through discussion.

3. Results

During the first search in January 2020, we found 131 articles that were analysed for duplicate removal, which resulted in 75 catalogued articles. This search was updated using the same strings and databases in September 2020, returning 55 new articles, 32 of which were not repeated. Therefore, 107 articles were reviewed in this SLR, of which three were unavailable. Of the resulting 104 articles, 77 were approved in the first filter, 61 in the second, and 53 in the third (Figure 2).

Figure 2: Systematic Literature Review (Flow diagram).

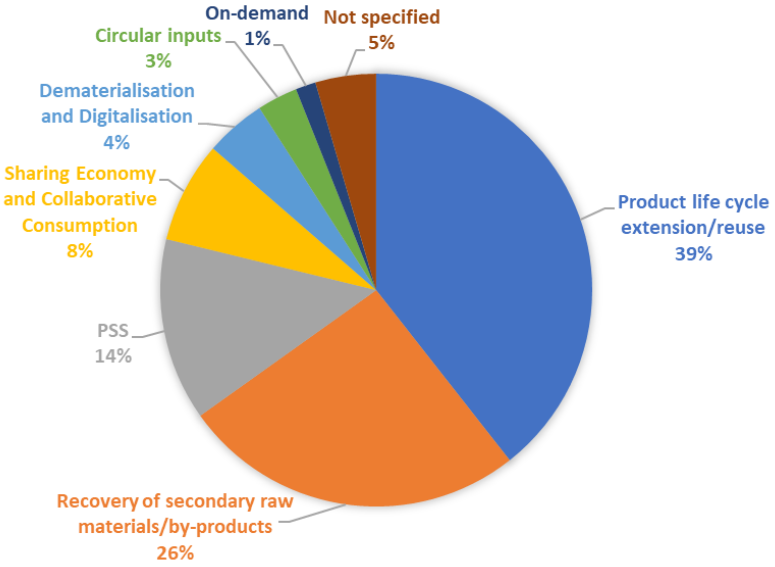


Source: Adapted from Page et al. (2021).

3.1. Summary of the review's results

Of the 53 articles analysed, 77% were published in 2019 or later, indicating that research on consumers' mindsets and behaviour towards a CE is recent in CE literature. Additionally, the majority of studies included in the review present their results according to circular business models (CBMs) (Figure 3); besides presenting their reflections on circular mindsets, behaviour, and/or influencing factors, these articles also contribute to the characterisation of consumers' engagement in specific CBMs.

Figure 3: Case studies divided by Circular Business Models.



Product life cycle extension/reuse was the circular business model addressed by the greater number of studies analysed. The circular behaviour and mindsets of consumers associated with this CBM mostly focus on the preservation and creation of value through the materiality of the products. The second most cited CBM was the recovery of secondary raw materials/by-products, which indicated consumers' mind-sets and behaviour concerned with closing the loop of production and consumption systems. These results show that most studies still focus on the materiality of circular offerings, which include return cycles, take-back systems, remanufacturing, and recycling.

Research concerning product-service systems (PSS), sharing economy, and collaborative consumption circular business models were also registered, and the circular mindsets and behaviour associated with them address the access, adoption, and sharing of products and services. A minor percentage of papers approached dematerialisation and digitisation, circular inputs, and on-demand, thereby suggesting a gap in the literature regarding these CBMs. These business models are associated with mindsets and behaviour concerning the reduction of material utilisation and dependency on finite resources.

Furthermore, we identified the types of products that the reviewed articles focused on. Studies concerning circular electronics, such as mobile phones and personal computers, were addressed in 16 articles, and represented the most common type of product found in our study. Articles addressing circular apparel (10 articles) and greener commuting modes (eight articles) were also fairly popular. Other types of products, such as household appliances, furniture, fast-moving consumer goods (FMCGs), and foods and drinks, were also registered through this systematic literature review.

3.2. Syntheses of results

3.2.1. *Circular mind-sets*

The circular mind-sets identified in our SLR are presented in Table 1.

Table 1: Consumers' circular mind-sets 10

CIRCULAR CONSUMER MIND-SETS	AUTHORS
FAVOUR ACQUISITION AND UTILISATION OF CIRCULAR PRODUCTS	Calvo-Porral; Levy-Mangin, 2020; Pisitsankkhakarn; Vassanadumrongdee, 2020; Russo et al., 2019; van Weelden et al., 2016; Wang; Hazen, 2016; Wang; Kuah, 2018; Wang et al., 2020
FAVOUR ACCESS INSTEAD OF OWNERSHIP	Barbu et al., 2018; Chamberlin; Boks, 2018; Mashhadi et al., 2019; Poppelaaresmm et al., 2020; Tunn et al., 2019
VALUE PARTICIPATION IN MATERIAL RECIRCULATION	Botelho et al., 2016; van der Laan; Aurisicchio, 2019
FAVOUR DIGITAL AND SHARED CIRCULAR SERVICES	Camacho-Otero et al., 2019; Poppelaaresmm et al., 2018
RESISTANCE TO OBSOLESCENCE	Chamberlin; Boks, 2018; Haines-Gadd et al., 2018
VALUE MULTI-FUNCTIONAL PRODUCTS	Kasulaitis et al., 2020

Favouring the acquisition/utilisation of circular products is common to the majority of studies that present circular mindsets. Calvo-Porral and Levy-Mangin (2020) identify this mindset as a variable that precedes the acquisition of circular products, such as remanufactured (Pisitsankkhakarn; Vassanadumrongdee, 2020; Wang; Hazen, 2016; Wang and Kuah, 2018; Wang et al., 2020), recycled products (Calvo-Porra; Levy-Mangin, 2020), and refurbished products (van Weelden et al., 2016). According to Russo et al. (2019), this mindset also expresses consumers' willingness to switch their buying behaviour by preferring circular products instead of unsustainable ones, for example, choosing bio-based packaging made from regenerated bio-waste instead of non-degradable packaging (Russo et al., 2019).

Favouring access rather than ownership is a mindset associated with consumers who adopt service-based (Chamberlin; Boks, 2018; Mashhadi et al., 2019; Poppelaaresmm et al., 2020; Tunn et al., 2019) or shared business models (Barbu et al., 2018). According to Barbu et al. (2018), this mindset expresses a pre-disposition to new and innovative forms of consumption, thus valuing the utility of products and resources and expressing a shift in consumers' preferences (Mashhadi et al., 2019). Furthermore, Poppelaaresmm et al. (2020) highlight the importance of this mindset for the successful return of products to manufacturers at the end of their life cycle by enabling detachment from products' access to their ownership.

Botelho et al. (2016) and van der Laan and Aurisicchio (2019) associate valuing participation in material recirculation mindset with consumers' pre-disposition to participate in take-back systems and is considered a key variable for the collection and recycling of products and materials, thus contributing to the product life cycle extension/reuse circular business model. Camacho-Otero et al. (2019) assert the pre-disposition to accept digital and shared circular

offerings as a mindset that helps users satisfy their consumption needs while complying with CE principles. Poppelaaresmm et al. (2018) state that digital access to services embedded in physical products, e.g., smartphones, and cloud/backup services can enhance consumers' pre-disposition to return their products and engage in access-based business models.

Resistance to obsolescence concerns the mindset of consumers who are predisposed to prevent the early disposal of products, promote their long use, and therefore mitigate excessive consumption (Chamberlin; Boks, 2018). According to Haines-Gadd et al. (2018), consumers with this mindset value circular offerings that promote lasting relationships between them and manufacturers, while enhancing product longevity and slowing inner loops.

Finally, Kasulaitis et al. (2020) present a consumer mindset that expresses consumers' pre-disposition and preference to accept multi-functional over single-or few-function products. This mindset is related to technological progress, dematerialisation of products, and enhancement of material efficiency in electronic products such as TVs and smartphones (Kasulaitis et al., 2020)

3.2.2. Circular behaviour

Consumer behaviour is the realisation of circular mindsets. Throughout the consumption system, consumers' circular behaviour can be expressed in many ways and at many stages of the consumption chain. Table 2 presents the circular behaviour identified in the SLR.

Table 2: Consumers' Circular Behaviour

CONSUMER CIRCULAR BEHAVIOUR	STAGES	AUTHORS
ACQUIRE RECYCLED, REMANUFACTURED, OR RECONDITIONED PRODUCTS	Pre-acquisition During acquisition	Baier et al., 2020; Calvo-Porral and Levy-Mangin, 2020; Esmaeilian et al., 2020; Feng et al., 2021; Gan; Chen, 2019; Hazen et al., 2016; Kuah and Wang, 2020; Mugge et al., 2018; Muranko et al., 2018; Muranko et al., 2019; Wallner et al., 2020; Wang and Hazen, 2016; Wang and Kuah, 2018
CARE FOR AND PERFORM MAINTENANCE ON PRODUCTS	Post-acquisition Pre-utilisation During-utilisation	Ackermann, 2018; Ackermann et al., 2018; Baier et al., 2020; Botelho et al., 2016; Chamberlin; Boks, 2018; Daae et al., 2018; Esmaeilian et al., 2020; Muranko et al., 2018; Wastling et al., 2018
RETURN PRODUCTS AT THEIR END OF LIFE	Post-utilisation	Botelho et al., 2016; Esmaeilian et al., 2020; Lakatos et al., 2016; Mansuy et al., 2020; Nowakowski, 2019; Poppelaaresmm et al., 2020; van der Laan; Aurisicchio, 2019; Wastling et al., 2018; Wang; Kuah, 2018
SEPARATE WASTE	Post-utilisation	Campbell-Johnston et al., 2019; Guo et al., 2017; Lakatos et al., 2016; Lakatos et al., 2018; Mansuy et al., 2020; Tong et al., 2018; van der Laan; Aurisicchio, 2019
ACQUIRE CERTIFIED GREEN PRODUCTS	Pre-acquisition During acquisition	Baier et al., 2020; Esmaeilian et al., 2020; Ferdousi; Qiang, 2016; Guo et al., 2017; Russo et al., 2019; Testa et al., 2020
RECYCLE GOODS	Post-utilisation	Botelho et al., 2016; Campbell-Johnston et al., 2019; Chamberlin; Boks, 2018; Daae et al., 2018; Guo et al., 2017; Tong et al., 2018
REUSE GOODS	During-utilisation Post-utilisation	Baier et al., 2020; Campbell-Johnston et al., 2019; Chamberlin; Boks, 2018; Daae et al., 2018; Machado et al., 2019; Wastling et al., 2018

SHARE PRODUCTS AND SERVICES	Pre-acquisition During-acquisition During-utilisation Post-utilisation	Esmaeilian et al., 2020; Kuah; Wang, 2020; Muranko et al., 2018; Patti, 2017; Tunn et al., 2020
ADOPT USE-ORIENTED PRODUCTS AND SERVICES	Pre-acquisition During acquisition	Barbu et al., 2018; Chamberlin; Boks, 2018; D'agostin et al., 2020; Mashhadi et al., 2019; Tunn et al., 2020
DISPOSE OF PRODUCT/WASTE APPROPRIATELY	Post-utilisation	Clark et al., 2020; Esmaeilian et al., 2020; Nenckova et al., 2020; Sarigöllü et al., 2020
REDUCE CONSUMPTION	Pre-acquisition During-utilisation Post-utilisation	Baier et al., 2020; Campbell-Johnston et al., 2019; Esmaeilian et al., 2020
SAVE ENERGY AND WATER	Post-acquisition Pre-utilisation During-utilisation Post-utilisation	Esmaeilian et al., 2020; Guo et al., 2017
USE REFILLS	Pre-acquisition During-acquisition Post-utilisation	van der Laan; Aurisicchio, 2019
CONSUME LOCALLY	Pre-acquisition During-acquisition	Esmaeilian et al., 2020
CONSUME ORGANIC PRODUCTS	Pre-acquisition During-acquisition	Fogarassy et al., 2020

The consumer behaviour of acquiring products that have been recycled, remanufactured, or reconditioned is closely related to acceptance and engagement with the product life cycle extension/reuse circular business model. This behaviour has been broadly mentioned in the literature concerning specific products, such as apparel (Baier et al., 2020), bicycles (Gan and Chen, 2019), and electrical and electronic (Feng et al., 2021; Kuah and Wang, 2020; Mugge et al., 2018), and also generalisations on any kind of recycled, remanufactured, or reconditioned products (Calvo-Porral and Levy-Mangin, 2020; Hazen et al., 2016; Muranko et al., 2018; Wang and Kuah, 2018). Esmaeilian et al. (2020) associate this behaviour with other circular behaviours across the consumption system, such as reducing consumption, product repair and maintenance, and returning products at their end of life, thus showing that circular consumption systems are designed as behaviour chains.

The second most-cited circular consumer behaviour in our SLR is caring for and maintaining products. According to Ackermann (2018), this behaviour is related to prolonging a product's lifetime through preventive measures (e.g. using a smartphone cover), performing maintenance (i.e. maintaining a product in a sound state), and repairing (i.e. restoring a product's utility). Studies on this behaviour have focused on two aspects of the circular consumption system: providing easy repair and maintenance products, and enabling and motivating consumers

to perform these activities (Ackermann, 2018; Baier et al., 2020; Botelho et al., 2016; Daae et al., 2018). These aspects are further discussed in the influencing factors section of the results. Furthermore, this behaviour extends through many stages of the consumption system by demanding conditions such as adequate storage, constant cleaning, and protective tools (Ackermann et al., 2018; Esmaeilian et al., 2020; Wastling et al., 2018). Additionally, it has been reported in consumption systems concerning long-lasting products, such as apparel (Baier et al., 2020) and electrical and electronic (Botelho et al., 2016), and fast-moving consumer goods (Muranko, et al., 2018).

The approaches concerning the return of products at the end of the lifecycle were fairly similar in the literature as a way to voucher consumers' participation in take-back systems (Botelho et al., 2016; Lakatos et al., 2016), including access-based systems (Poppelaaresmm et al., 2020; Wastling et al., 2018). This behaviour is highly important in completing the cyclical path proposed by the CE (Botelho et al., 2016), and is often related to waste separation (Lakatos et al., 2016; Mansuy et al., 2020; van der Laan; Aurisicchio, 2019).

Waste separation is also a circular behaviour present in the post-utilisation stage of the consumption system. In addition to being associated with take-back systems (Lakatos et al., 2016; Mansuy et al., 2020; van der Laan; Aurisicchio, 2019), it has been traced back to investigations concerning the daily behaviour of households in the CE context (Campbell-Johnston et al., 2019; Guo et al., 2017; Lakatos et al., 2018; Tong et al., 2018).

The acquisition of certified green products, conversely, is a consumer behaviour present in the pre- and during-acquisition stages, as this behaviour requires effort prior to the purchase; for example, browsing certified brands and products (Baier et al., 2020; Esmaeilian et al., 2020; Russo et al., 2019) and during the purchase by giving preference to available green products (Baier et al., 2020; Ferdousi; Qiang, 2016; Guo et al, 2017; Testa et al., 2020). This behaviour expresses consumers' willingness to break consumption patterns and test new products and brands (Testa et al., 2020).

In addition to waste separation, consumer recycling behaviour has been studied in the context of households' daily circular behaviour (Campbell-Johnston et al., 2019; Guo et al., 2017; Tong et al., 2018). Additionally, for some researchers, recycling behaviour was not directly associated with the recycling activity of consumers, but with consumers' destination of products to recycling facilities (Botelho et al., 2016; Chamberlin; Boks, 2018; Daae et al., 2018). Reusing behaviour represents the recirculation of products in their own consumption systems (Campbell-Johnston et al., 2019; Wastling et al., 2018) or in subsequent circular systems (Baier et al., 2020;

Machado et al., 2019; Wastling et al., 2018), thus maintaining their original purpose (Chamberlin; Boks, 2018; Daae et al., 2018).

Sharing products and services is a circular consumer behaviour associated in the literature with two business models, sharing economy and collaborative consumption, through physical (Kuah; Wang, 2020; Patti, 2017) or digital (Esmaeilian et al., 2020) platforms, and PSS (Muranko et al., 2018; Tunn et al., 2020). PSSs are also directly related to another circular behaviour: the adoption of use-oriented products and services (Chamberlin; Boks, 2018; D'agostin et al., 2020; Mashhadi et al., 2019; Tunn et al., 2020). Barbu et al. (2018) highlight the relevance of this behaviour for the sharing economy, by focusing on consumers' predisposition to access the product's function instead of owning it.

Consumer behaviour towards appropriate waste disposal was found in the CE literature on food packaging (Clark et al., 2020), textile products (Nenckova et al., 2020), and mobile phones (Sarigollu et al., 2020). Esmaeilian et al. (2020) focus on how virtual platforms and digital services can help consumers engage in circular behaviour towards waste disposal. Nenckova et al. (2020) hold that consumer preferences and behaviour concerning textile waste disposal are crucial in mapping where waste streams terminate and guiding efficient end-of-life strategies.

The reduction in consumption is displayed as an important behaviour for the successful transition to a CE in sectors where exacerbated consumption patterns prevail, such as the clothing industry (Baier et al., 2020). This behaviour has also been reported in the context of daily household activities (Campbell-Johnston et al., 2019; Esmaeilian et al., 2020). In the same household context, researchers have also presented energy and water saving as relevant consumer behaviour for the implementation of a CE (Esmaeilian et al., 2020; Guo et al., 2017).

Fogarassy et al. (2020) highlight the many roles consumers play in a CE and investigate the consumption of organic food as a pro-circular behaviour. Esmaeilian et al. (2020) emphasize blockchain as the future of the supply chain, and how digital networks support consumers in their transition to a CE, including access to services that promote local consumption. To conclude the mapped consumers' circular behaviour, in systems where products are designed for single-use as fast-moving consumer goods, researchers found opportunities to prolong these products' life cycles by promoting consumer behaviour such as using refills, for example, plastic bottles and water refill (van der Laan; Aurisicchio, 2019).

3.2.3. Factors influencing circular behaviour

In addition to identifying circular mindsets and behaviour, this study focused on finding and classifying the factors which influence circular behaviour and, consequently, circular mindsets. Each article analysed during this SLR had its own methodological approach, which

resulted in its own contribution to the CE literature. Therefore, this review does not propose to evaluate the most suitable approach when studying circular consumer behaviour but to present the factors that have been considered by the CE literature and have been found to influence circular consumer behaviour. Our review identified 54 factors, which were then classified according to their domain into seven categories: (*i*) political and legal, (*ii*) economic, (*iii*) environmental, (*iv*) demographic, (*v*) consumer-related, (*vi*) product/service offer, and (*vii*) product/service-related (Table 3).

Table 3: Factors influencing circular consumer behaviour.

Category	***Factor***	***Definition***	***Authors***
(i) Political and Legal	Macro-level forces	External factors, such as social institutions and infrastructure	Baier et al., 2020
	Government incentives	Interventions from governmental bodies that promote circular and environmentally friendly initiatives	Hazen et al., 2016
	Legal obligation	Obligation or duty that is enforced by legislation	Camacho-Otero et al., 2019
(ii) Economic	Price	An amount of payment (money) given in return for goods or services	Camacho-Otero et al., 2019; Chamberlin; Boks, 2018; Gan; Chen, 2019; Hazen et al., 2016; Kuah; Wang, 2020; Machado et al., 2019; Mansuy et al., 2020; Mashhadi et al., 2019; Sarigollu et al., 2020; van der Laan; Auriscchio, 2019; van Weelden et al., 2016; Wallner et al., 2020; Wang; Hazen, 2016; Wang et al., 2020
	Income	The amount of a gain, usually derived from capital or labour, received in a period	Fogarassy et al., 2020; Nenckova et al., 2020; Nowakowski, 2019
	Financial return	Bonus, discount, or prize given for a consumer due to their efforts in purchasing a service/product or returning a product at the end of life	Abuabara et al., 2019; Baier et al., 2020; Camacho-Otero et al., 2019; Chamberlin and Boks, 2018; Nowakowski, 2019; Poppelaaresmm et al., 2018;
	Savings	An economy of money, time, stress, or another resource	Baier et al., 2020; Barbu et al., 2018; Camacho-Otero et al., 2019; Kuah; Wang, 2020
(iii) Environmental	Scarcity of resources	When demand for a resource exceeds the supply	Gan; Chen, 2019; Machado et al., 2019
(iv) Demographic	Consumer age	The indication that being born in a certain period and having lived the crucial years of formation in a given cultural climate, characterised by particular historical events, leaves a trace on the ways of feeling, thinking, and acting of individuals	Baier et al., 2020; Botelho et al., 2016; D'agosting et al., 2020; Gazzola et al., 2020; Kuah; Wang, 2020; Nenckova et al., 2020
	Consumer gender	The indication that the consumer gender may influence awareness, sensitivity, acceptance, and adoption of circular behaviour	Baier et al., 2020; D'agosting et al., 2020; Gazzola et al., 2020; Nenckova et al., 2020
	Consumer level of education	The progression of the formal learning experience	Fogarassy et al., 2020; Nenckova et al., 2020
	Consumer's nationality	The indication that a circular behaviour may be influenced by environmental conditions, cultural aspects, and social norms	Fogarassy et al., 2020

Category		Factor	Definition	Authors
(iv)	*Demographic*	Number of household members	The indication that a circular behaviour may be influenced by the number of people that reside in the same home	Nenckova et al., 2020
(iv)	*Consumer Related*	Environmental awareness and concern	The awareness which drives consumers' attitudes regarding the environment, sustainability, and circularity	Abuabara et al., 2019; Botelho et al., 2016; Chamberlin; Boks, 2018; Clark et al., 2020; D'agosting et al., 2020; Ferdousi; Qiang, 2016; Guo et al., 2017; Hazen et al., 2016; Kuah; Wang, 2020; Machado et al., 2019; Nowakowski, 2019; Patti, 2017; Shao, 2019; Testa et al., 2020; van Weelden et al., 2016; Wallner et al., 2020; Wang; Hazen, 2016; Wang; Kuah, 2018
		Attitude	The degree to which an individual has an unfavourable or favourable appraisal of the behaviour in question	Camacho-Otero et al., 2019; Hazen et al., 2016; Lakatos et al., 2016; Mashhadi et al., 2019; Muranko et al., 2018; Pisitsankkhakarn; Vassanadumrongdee, 2020; Singh; Giacosa, 2018; van Weelden et al., 2016; Wang et al., 2020
		Fear of contamination/disgust/lack of trust	The perception of safety risks related to hygiene, especially due to previous use	Calvo-Porral; Levy-Mangin, 2020; Chamberlin; Boks, 2018; D'agosting et al., 2020; Kuah; Wang, 2020; Poppelaaresm et al., 2018; Wang et al., 2020
		Motivation	The reasoning to behave in a particular way, related to financial aspects, pleasure, functionality, aesthetics, rebellion against the brand policy, fit with participant's identity, irreplaceability, shared ownership, etc.	Ackermann, 2018; Ackermann et al. (2018); Botelho et al., 2016
		Ability	If people can perform the behaviour, depends on time, money, physical effort, brain cycles, social deviance, and routine	Ackermann, 2018; Ackermann et al., 2018;
		Product attachment	An emotional connection that leads to an increased likelihood of care activities towards the product and to postponing replacement	Haines-Gadd et al., 2018; Sarigollu et al., 2020; Singh; Giacosa, 2018
		Intention	Represents the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour	Hazen et al., 2016; Muranko et al., 2018; Russo et al., 2019; Shao, 2019
		Current sustainable/circular behaviour	The pro-environmental behaviour that consumers/users already perform	Clark et al., 2020; Lakatos et al., 2016; Mashhadi et al., 2019; Testa et al., 2020

Category		Factor	Definition	Authors
(v)	*Consumer Related*	Environmental values	Reflect a concern with the quality of nature and the environment for its own sake, without a clear link to the welfare of other human beings	Muranko et al., 2018
		Desire for change	The degree to which a person is willing to change their current behaviour	Camacho-Otero et al., 2019; Testa et al., 2020
		Materialism	The centrality of acquisition-related activities in a person's life and how they prioritize possessions over other things in life	Camacho-Otero et al., 2019
		Peer pressure	Influence from members of a group	Mashhadi et al., 2019
		Norms	Feelings of a moral obligation to perform a certain behaviour	Camacho-Otero et al., 2019; Muranko et al., 2018; Singh; Giacosa, 2018; Pisitsankkhakarn; Vassanadumrongdee, 2020; Tong et al., 2018
		Previous experiences	Past experiences with similar offerings (products and services)	Camacho-Otero et al., 2019
		Desire to perform good deeds	Acknowledging the positive social impact related to the behaviour	Abuabara et al., 2019
		Rejection of mass production	Reducing the use of natural resources and diminishing the production of garbage can motivate certain behaviour	Machado et al., 2019
		Lifestyle	A manner of living that reflects the person's values and attitudes	Fogarassy et al., 2020; Patti, 2017
		Environmental self-identity	The extent to which a person sees themself as a type of person who acts environmentally friendly	Russo et al., 2019
		Digital access	The access of services on digital platforms	Esmaeilian et al., 2020
		Digital confidence	Users' digital literacy and confidence to use digital products, which includes privacy, security, and adoption	Tunn et al., 2020
(vi)	*Product/Service Offer*	Convenience	Ease for a consumer to include circular efforts in his/her routine	Abuabara et al., 2019; Chamberlin; Boks, 2018; Clark et al., 2020; D'agosting et al., 2020; Kuah; Wang, 2020; Mansuy et al., 2020; Poppelaaresm et al., 2018
		Customer service/support	Warranty, maintenance, etc.	Chamberlin; Boks, 2018; Gan; Chen, 2019; Poppelaaresm et al., 2018; van Weelden et al., 2016
		Closeness	The distance between consumers' home to the store (consumption) or the pick-up point (take-back system)	Abuabara et al., 2019; Botelho et al., 2016; Camacho-Otero et al., 2019

Category	Factor	Definition	Authors
(vi) Product/Service Offer	Triggers	Stimuli that provoke a behaviour by enhancing either motivation or ability or by working as a signal	Ackermann, 2018; Ackermann et al., 2018
	Availability	The quality of being able to be used or obtained	Chamberlin; Boks, 2018; van Weelden et al., 2016
	Ownership	Way of providing a service that assimilates to the familiar ownership	Chamberlin; Boks, 2018; Kuah; Wang, 2020; Poppelaaresmm et al., 2020; Singh; Giacosa, 2018
	Familiarity with business model	How well consumers understand a product/service value proposition	Kuah; Wang, 2020; Poppelaaresm et al., 2018; van Weelden et al., 2016
	Persuasive communication	Messages that are intended to shape, reinforce, or change the responses of another or others	Muranko et al., 2018
	Customisation	To make or include something according to the buyer's or user's needs	Tunn et al., 2019
	Obsolescence	How fast a product becomes outdated	van Weelden et al., 2016;
(vii) Product/Service Related	Product information and history	How this product was used in the past and how it can meet the consumer needs	Baier et al., 2020; Ferdousi; Qiang, 2016; Fogarassy et al., 2020; Gan; Chen, 2019; Kuah; Wang, 2020; Mugge et al., 2018; Pisitsankkhakarn; Vassanadumrongdee, 2020; Shao, 2019; van Weelden et al., 2016; Wang et al., 2020
	Quality/performance	The degree of excellence of a product or service	Campbell-Johnston et al., 2019; Chamberlin; Boks, 2018; Fogarassy et al., 2020; Gan; Chen, 2019; Kuah; Wang, 2020; Machado et al., 2019; Pisitsankkhakarn; Vassanadumrongdee, 2020; Sarigollu et al., 2020; van Weelden et al., 2016; Wang; Hazen, 2016
	Design	How the design addresses functionality, comfort, fashion, etc.	Chamberlin; Boks, 2018; D'agosting et al., 2020; Gan; Chen, 2019
	Brand image/Reliability	The extent to which a brand is seen as 'green'/'sustainable'/circular, trustworthy and reliable	Chamberlin; Boks, 2018; Gan; Chen, 2019; Kuah; Wang, 2020; Poppelaaresm et al., 2018; van Weelden et al., 2016
	Technology employed	Addresses the offering usability and innovation	Camacho-Otero et al., 2019; Gan; Chen, 2019; Kasulaitis et al., 2020; Poppelaaresm et al., 2018; van Weelden et al., 2016
	Ease of use	Consistency with the values, experiences and needs of potential users	Barbu et al., 2018; Camacho-Otero et al., 2019
	Aesthetic needs	To meet a desirable appearance	Pisitsankkhakarn; Vassanadumrongdee, 2020; Wallner et al., 2020
	Utility	How the product meets a need	Barbu et al., 2018
	Size/type of product	The size of the product can influence the convenience of some circular behaviour	Botelho et al., 2016
	Product 'green' image	How the product or service is perceived as green by its customers and others	Calvo-Porral; Levy-Mangin, 2020
	Material perception	Visual and tactile perception	Clark et al., 2020

3.2.3.1. Political and Legal factors

The political and legal category refers to factors concerning legislation and public policies such as obligations, incentives, and macro-level forces. Baier et al. (2020) indicate that external forces at the macro level (e.g. social institutions, economic forces, or physical structures) can act as drivers or barriers to the pro-environmental behaviour of clothing consumers. Camacho-Otero et al. (2019) establish that issues concerning the legal implications of transactions and agreements can negatively influence the adoption of circular garments. Furthermore, the migration of consumers from traditional (linear) systems to circular ones is associated with government incentives, such as taxes and subsidies, which can affect the organisation and/or the market, thus making circular products more appealing to consumers (Hazen et al., 2016).

3.2.3.2. Economic factors

The second influencing category is economy, which comprises four factors: price, income, financial return, and savings. Price is one of the most-cited factors in the SLR, and therefore, one of the main influencers of circular behaviour from an economic perspective (Camacho-Otero et al., 2019). Competitive prices are reported as determinants of consumer engagement (Chamberlin; Boks, 2018; Gan; Chen, 2019); therefore, circular products and services with fair and low prices are indicated as positive influencers of circular behaviour (Camacho-Otero et al., 2019; Patti, 2017; van Weelden et al., 2016), especially when associated with high quality (Machado et al., 2019). Wallner et al. (2020) aver that consumer often choose refurbished products because they are cheaper and, therefore, they can opt for premium products compared to the required investment for a new product. Kuah and Wang (2020) find that the low cost of remanufactured products can drive consumer engagement. Wang and Hazen (2016) confirm that the lower cost of remanufactured products is positively related to the perceived value of remanufactured products and acquisition intention, whereas a high perceived price of new products is positively related to consumers' attitudes towards remanufactured products (Wang et al., 2020). Concerning access-based business models, products with lower monthly payments present better consumer acceptance than those with higher monthly payments (Poppelaaresm et al., 2020). Hazen et al. (2016) believe that consumers are more likely to switch to circular products/services if they perceive the costs of their current/linear products or service providers to be high. Moreover, in product-service systems, consumers are more likely to lease if they perceive that the lease

cost is lower than the acquisition cost (Mashhadi et al., 2019). Concerning collection services, consumers show preferences for cheaper alternatives, even when they require more effort (Mansuy et al., 2020). When a product's original cost is perceived as high, consumers prefer to resell or give away their products instead of participating in take-back systems (Sarigollu et al., 2020).

The income of the participants was found to be a relevant economic factor in circular behaviour. While Fogarassy et al. (2020) hold that high income is associated with circular acquisition behaviour (purchase of organic food), Nowakowski (2019) find that people living in poverty are likely to participate in electrical and electronic waste take-back systems, as selling scrap metals is a method of earning money for basic expenses. Additionally, Nenckova et al. (2020) affirm that people with higher incomes tend to separate their textile waste for appropriate disposal, compared to other socio-economic groups.

Studies also prove how financial returns, in the form of bonuses and prizes, can lead to customer participation in circular consumption systems as a way to engage consumers and get them to familiarise themselves with CBM (Camacho-Otero et al., 2019; Chamberlin; Boks, 2018) or as a reward for taking part in circular systems, for example, in take-back systems (Abuabara et al., 2019; Nowakowski, 2019; Poppelaaresm et al., 2018). Furthermore, a study in the textile industry reports that the lack of bonuses and prizes in circular consumption systems could decrease consumer satisfaction and, therefore, circular behaviour (Baier et al., 2020).

The last economic influence factor is 'savings', as in discounts for the purchase of sustainable/circular products and services, which are found to positively influence circular behaviour (Baier et al., 2020; Barbu et al., 2018; Camacho-Otero et al., 2019; Kuah; Wang, 2020).

3.2.3.3. Environmental factor

Simultaneously, resource scarcity can motivate organisations to adopt circular business models; this factor can also influence consumers' behaviour. Gan and Chen (2019) and Machado et al. (2019) found that consumers seek products or materials that are not easily available, thereby adding to the uniqueness of their consumption experience.

However, factors concerning the environment were not broadly presented or discussed in the CE literature, indicating that studies concerning factors such as the

availability of resources, climate change, physical surroundings, and their influence on circular consumption behaviour could be further analysed.

3.2.3.4. Demographic factors

The fourth category of influencing factors is demography, under which studies have explored the influence of age, gender, level of education, nationality of consumers, and the number of household members. The relationship between these factors and consumer circular behaviour differs according to the type of product, business model, and research scope, which suggests that there is no consensus among studies on the influence of demographic factors and their significance among CE consumers.

Considering, for example, consumers' age, D'agosting et al. (2020) find that older consumers are more likely to adopt use-oriented PSS (bicycle leasing), while Kuah and Wang (2020) report that because younger generations have had more experience using sharing platforms, they are more willing to try these platforms in the future. Younger consumers are also more likely to purchase organic food (Fogarassy et al., 2020) and sustainable apparel (Gazzola et al., 2020), while older individuals might prefer to participate in return schemes (Botelho et al., 2016) and to treat textiles in ways which extend their life cycle or enable subsequent utilisation, rather than just discarding them (Nenckova et al., 2020). Differences in circular behaviour with respect to consumer gender were also investigated. Studies have found that women are more likely to engage in circular behaviour, such as the adoption of use-oriented PSS (D'agosting et al., 2020), acquiring sustainable apparel (Baier et al., 2020; Gazzola et al., 2020) and separation and appropriate disposal of textile products (Nenckova et al., 2020).

Few studies have examined the influence of consumers' education level on circular behaviour. However, higher levels of education are related to the purchase of organic food (Fogarassy et al., 2020) and waste separation (Nenckova et al., 2020). The purchase of organic food is further associated with consumer nationalities, as people in developed countries are expected to believe that organic farming is a better choice for climate protection, animal welfare, and the environment (Fogarassy et al., 2020). To conclude demographic factors, households with few members (1–2) presented a higher rate in textile waste separation and disposal (Nenckova et al., 2020).

3.2.3.5. Consumer related factors

This category includes influencing variables concerning consumers' intrinsic aspects and contains the majority of factors found in the literature, thus indicating that it

is one of the main themes explored in terms of circular consumption and consumer behaviour. Many studies have cited environmental awareness and concern as consumers' awareness of sustainability issues (e.g. depleting natural resources, global warming, and pollution), which positively influences circular behaviour. Therefore, consumers are aware that circular products envision environmental benefits (Ferdousi; Qiang, 2016; Hazen et al., 2016; van Weelden et al., 2016), or that linear products cause negative environmental impacts (Chamberlin; Boks, 2018) and promote their engagement with circular behaviours. Shao (2019) reports that consumers who are aware of environmental issues, such as the depletion of natural resources, global warming, and pollution, consider them when making purchase decisions, and participants in Wallner et al. (2020) state that they had purchased refurbished products because reusing products saves natural resources and reduces the amount of waste that is produced. Wang and Hazen (2016) find that environmental awareness regarding remanufactured products is positively related to the perceived value of remanufactured products and acquisition intention; however, in Asia, environmentally conscious consumers do not show a high appreciation for the green concept of remanufactured products (Wang; Kuah, 2018). Environmental awareness and concern have also been found in other research contexts, such as participation in take-back systems (Abuabara et al., 2019; Botelho et al., 2016; Nowakowski, 2019), adoption of product-service systems (D'agosting et al., 2020; Kuah; Wang, 2020; Patti, 2017), daily sustainable behaviour (Clark et al., 2020; Guo et al., 2017), and packaging (Testa et al., 2020). Machado et al. (2019) establish that consuming second-hand clothing purchased in thrift stores enhances consumers' environmental awareness and, consequently, their engagement with other circular behaviours.

Consumers' positive or negative attitudes towards circular products or services are frequently cited in the literature. In our SLR, attitude was found to influence intention to behave circularly, indirectly influencing engagement with circular behaviour (Muranko et al., 2018; Pisitsankkhakarn; Vassanadumrongdee, 2020) or switching behaviour (Hazen et al., 2016; Wang et al., 2020). Individuals who have a positive attitude toward circular behaviour, that is, consider circular behaviour important and beneficial for the economy and the environment, are likely to perform these behaviours (Lakatos et al., 2016; Mashhadi et al., 2019). Moreover, van Weelden et al. (2016) find that enthusiastic attitudes toward refurbished products drove their acquisition. Consequently, negative attitudes act as barriers to circular engagement (Camacho-Otero et al., 2019; Singh and Giacosa, 2018).

Another influencing factor related to consumers is motivation, which is influenced by external factors (e.g. the usability of a product) and varies according to the context associated with circular behaviour (Ackermann, 2018). In our SLR, motivation was found to influence product care (Ackermann et al., 2018) and the recovery of electrical and electronic waste (Botelho et al., 2016). Additionally, consumers' ability to engage in circular behaviour, related to the knowledge, skills, tools, time, and effort needed to perform the behaviour, has only been addressed by two articles concerning product care (Ackermann, 2018; Ackermann et al., 2018). Consumers' perceived ability to perform product care was positively associated with this behaviour. Moreover, consumers' intention toward circular behaviour is perceived as the final step toward performing the behaviour; therefore, high levels of intention positively influence consumer engagement in circular consumption systems (Hazen et al., 2016; Muranko et al., 2018; Shao, 2019).

Interestingly, individuals who currently perform sustainable or circular behaviour are found to be more likely to perform other circular behaviours (Clark et al., 2020; Lakatos et al., 2016; Russo et al., 2019), and continue to perform their current behaviour (Mashhadi et al., 2019). Consumers' self-identity may also have a significant impact on purchase intention and the intention to switch to circular behaviour and products (Russo et al., 2019). Likewise, circular behaviour can be influenced by consumers' environmental values, which can be used when designing interventions to guide changes in consumer behaviour (Muranko et al., 2018). This factor can be related to consumers' rejection of mass products by, for example, rethinking how fashion can be consumed and adopting sustainable apparel (Machado et al., 2019). In addition to valuing the natural environment, consumers may also value and desire to perform good deeds by supporting social causes such as donating products at the end of their life cycle to marginalised communities (Abuabara et al., 2019).

However, social norms, perceived as collective obligations, concerning linear patterns of production negatively affect customers' circular behavioural intentions (Muranko et al., 2018; Singh; Giacosa, 2018). The pressure and experiences of peers also influence consumer behaviour. Mashhadi et al. (2019) show that individuals whose friends and family lease their phones feel compeled to do so. Additionally, positive previous experiences with a product or service keep consumers engaged in circular consumption systems (Camacho-Otero et al., 2019). Moreover, consumers' current sustainable lifestyle, or wish to develop one, positively influences the adoption of circular behaviour (D'Agostin et al., 2020; Patti, 2017), especially when they perceive that

circular purchases can help them achieve this lifestyle, such as the consumption of organic food (Fogarassy et al., 2020).

The desire to try different consumption experiences is also positively relevant for circular behaviour, as circular products and services are considered innovative, which enhances consumer satisfaction (Camacho-Otero et al., 2019; Testa et al., 2020). Furthermore, consumers who exhibit high levels of materialism may value the uniqueness of circular products (Camacho-Otero et al., 2019). Consumers can also attach themselves to physical products. Singh and Giacosa (2018) find that if a consumer develops an emotional bond with a product, they are more likely to care for the product, repair it when possible, and postpone its replacement, which eventually leads to product longevity. However, this attachment can also prevent appropriate waste disposal and culminate in unsustainable behaviour, such as hoarding (Sarigollu et al., 2020).

Fear of contamination, disgust, and lack of trust are common factors reported by consumers engaged in business models related to sharing behaviour (D'Agostin et al., 2020; Kuah; Wang, 2020; Poppelaaresm et al., 2020) or the subsequent use of products (Calvo-Porral; Levy-Mangin, 2020; Poppelaaresm et al., 2018). They evoke concerns about hygiene and digital safety, thus negatively impacting consumers' circular behaviour and engagement (Chamberlin; Boks, 2018).

Consumers' digital access and confidence can also affect circular behaviour. Access to digital platforms in access-based PSS, for instance, is an enabling factor for this circular behaviour (Esmaeilian et al., 2020), and individuals' confidence in digital services influences their attitude and, consequently, their behaviour (Tunn et al., 2020).

3.2.3.6. Products/service offer factors

The sixth category of influencing factors concerns the factors associated with how products and services are offered to consumers. The most cited factor in our SLR under this category was 'convenience'. Studies show that when the convenience of circular offerings is communicated (e.g. 'dry cleaning is on us'), consumers are more likely to perform circular behaviour (Chamberlin; Boks, 2018; Clark et al., 2020; Poppelaaresm et al., 2020). Additionally, the lack of convenience can be a barrier or an impediment for the acquisition of circular products (D'agosting et al., 2020), the use of sharing platforms (Kuah; Wang, 2020), engagement with take-back systems (Mansuy et al., 2020), and the appropriate disposal of waste (Abuabara et al., 2019).

The existence of customer service and support was found to positively influence consumers' engagement in circular behaviour. Chamberlin and Boks (2018) and Gan and Chen (2019) indicate proving warranty, for example, as an important measure to engage customers in circular consumption systems. Poppelaaresm et al. (2018) highlight that good customer service and guidance throughout maintenance and repair processes are esteemed by individuals who adopt access-based services. Moreover, the offer of customer service and support is desirable and is found to decrease the perceived risk associated with refurbished products (van Weelden et al., 2016).

The closeness of circular offerings is also indicated as a relevant factor in engaging circular consumers. Recycling and taking-back behaviours are enhanced when collection points are closer to consumers (Abuabara et al., 2019; Botelho et al., 2016), however, when financial returns are offered, consumers may be willing to travel greater distances (Abuabara et al., 2019). Additionally, the distance of manufacturing units or logistics centres can influence circular consumer behaviour, as long delivery waiting time is perceived as unfavourable by consumers (Camacho-Otero et al., 2019).

Triggers affect circular consumption behaviour, as they positively influence consumer engagement, for example, consumers' assumption leads them to be challenged to perform a behaviour (Ackermann, 2018; Ackermann et al., 2018). Triggers can also negatively influence circular behaviour, for instance, when they suddenly dislike a product's appearance or functionality (Ackermann, 2018; Ackermann et al., 2018).

The availability of circular products and services has been identified as a relevant factor guiding the consumption of circular products. Chamberlin and Boks (2018) find that when products are easily available and consumers do not have to wait for their products, circular consumption is enhanced. Furthermore, the lack of easily available circular products, such as refurbished ones, may result in consumers not considering them when planning or performing an acquisition (van Weelden et al., 2016).

Circular offerings that focus on product access can be influenced by perceptions of ownership. Kuah and Wang (2020) and Poppelaaresm et al. (2020) report that the preference for e-gadgets is a barrier to engaging on sharing platforms. Psychological ownership has also been found to inhibit the diffusion of access-based business models (Singh; Giacosa, 2018), while the communication of circular offerings as familiar/usual offerings can be used to encourage consumers to engage with circular products and close the gap between actual ownership and consumers' expectations of ownership in clothing rental services (Chamberlin; Boks, 2018). Concerning access-based offerings, a lack of

familiarity with the business model negatively influences consumer engagement (Kuah; Wang, 2020; Poppelaaresm et al., 2018), as the misunderstanding of terms and conditions and unsatisfactory compensation for consumers' sacrifice of not owning products often leads to an early rejection of the product/service. The lack of familiarity with refurbished products has also been indicated as a major cause of low consumer acceptance (van Weelden et al., 2016).

Conversely, temporary customisation of shared products was found to increase the perceived value of products, giving consumers a sense of psychological ownership, thus causing them to take better care of the products and resulting in a wider acceptance of access-based products (Tunn et al., 2019). The obsolescence of products that are going through a consecutive life was indicated by consumers as a factor that negatively influences the adoption of circular products, especially those that may have limitations with respect to their technological capabilities (van Weelden et al., 2016). To conclude this category, persuasive communication, messages shared when offering a product or service, are intended to shape, reinforce, or change behaviour, and influence consumers' beliefs, values, and attitudes, and therefore, can be used to encourage circular behaviour (Muranko et al., 2018).

3.2.3.7. Products/service-related factors

The last category identified in this SLR concerns factors related to the features of circular products and services. Product information and history, for instance, are indicated as important factors in circular business models that promote the next life of products. Visual information (e.g. signs of wear and tear) and verbal communication of prior use can lead to consumers' negative evaluations of refurbished products (Mugge et al., 2018). Conversely, a lack of information about specific information regarding the characteristics of refurbishment can keep consumers away (van Weelden et al., 2016). Other studies also indicate that positive communication and detailed information on products' prior use positively influence consumer engagement (Gan; Chen, 2019; Pisitsankkhakarn; Vassanadumrongdee, 2020; Wang et al., 2020). Kuah and Wang (2020) find that a lack of information on a product or its manufacturer hinders the establishment of trust between consumers and products, while full product information transparency can drive consumers to pay higher prices for products (Shao, 2019). Moreover, the use of labels such as traffic lights indicating sustainability levels is perceived by consumers as

attractive (Baier et al., 2020) and can positively influence engagement with circular products (Ferdousi; Qiang, 2016; Fogarassy et al., 2020).

The quality and performance of services and products can influence consumer behaviour, especially when positively communicated (Chamberlin and Boks, 2018). Consumer behaviour is enhanced when the perceived quality of a circular product or service is high (Gan; Chen, 2019; Machado et al., 2019; Sarigollu et al., 2020). Consumers of recycled, refurbished, and remanufactured products perceive that their quality is inversely related to the perceived risk of purchasing these products (Kuah and Wang, 2020; van Weelden et al., 2016; Wang and Hazen, 2016). In addition to material and technological qualities, Fogarassy et al. (2020) find that consumers value organic products from small farmers because of their higher quality in terms of social responsibility. Additionally, the perception of product or material quality can increase hoarding and decrease circular flows in take-bake systems (Campbell-Johnston et al., 2019; Pisitsankkhakarn; Vassanadumrongdee, 2020).

The image and reliability of the product brand or service provider also influence circular consumer behaviour, such as how well they communicate their circular purpose (Chamberlin; Boks, 2018). The positive brand reputation and trustworthiness of the original manufacturer and remanufacturer can positively influence engagement with these kinds of circular products (Gan; Chen, 2019; van Weelden et al., 2016), while the low reliability of remanufacturers (Kuah; Wang, 2020) and poor image of service providers (Poppelaaresm et al., 2018) have the opposite impact. Moreover, the green image of products, that is, consumers' realisation that they are circular/sustainable, can drive their acceptance and acquisition (Calvo-Porral; Levy-Mangin, 2020).

Designs that are functional (D'agosting et al., 2020), unique (Gan; Chen, 2019), and evoke consumer values (Chamberlin; Boks, 2018) can enhance the acquisition of circular products or services. Furthermore, when the physical appearance of products meets consumers' aesthetic needs, their intention to purchase circular products increases (Pisitsankkhakarn; Vassanadumrongdee, 2020; Wallner et al., 2020). Likewise, the employment of innovative (Gan and Chen, 2019), multifunctional (Kasulaitis et al., 2020), and fun (Poppelaaresm al., 2018) technologies is considered by consumers, which drives them to consume circular products. However, if the consumer is not up-to-date with the technology employed, which costs an extra learning effort, then this factor can

have a negative influence on engagement with circular behaviour (Camacho-Otero et al., 2019; van Weelden et al., 2016). Ease of use, not only for technological products, has been highlighted in other studies. Barbu et al. (2018) and Camacho-Otero et al. (2019) find that when a products' functionality is easy to access and fits well in consumers' domestic life, they are more likely to opt for these products. Furthermore, if a product meets consumers' needs in terms of utility, they are more likely to opt for shared or access-based products (Barbu et al., 2018). Material perception can also influence circular behaviour; for example, the awareness that a product is made of plastic and, for that reason, the consumer opts for another product (Clark et al., 2020). Moreover, the type or size of products impacts appropriate waste disposal, which is related to the burden of keeping or transporting specific types of products (Botelho et al., 2016).

4. Discussion

In the following sub-sections, we discuss the main findings of our SLR and our reflections on the features and roles of circular mindsets and behaviours and their influencing factors, and present and analyse our framework on circular consumption systems. Finally, we outline the limitations and recommendations for future research of this study.

4.1. Discussion on the Systematic Literature Review results

This SLR focuses on mapping the elements that affect circular consumption systems, mindsets, behaviour, and their influencing factors. The CE proposes a new way to think and design business models and products and to operationalise the manufacturing and offering of goods. These innovations require changes in how organisations function daily, in the technologies and processes employed, in the required capabilities and competencies, and even in the organisational culture.

These changes also reflect how consumers perceive products and services, functionality, and value, among other features. Therefore, the transition from a linear to CE affects people's participation in consumption systems. However, our results show that little attention is paid to consumers' pre-disposition to engage with CE. Circular mindsets express an alignment between the circular value proposition and consumers' values, resulting in dispositions to engage with circular business models. Thus, we indicate the foundations of consumers' circular mindsets as follows.

(a) Correlation to circular business models;

(b) Envisioning of benefits for the environment, economy, and society;

(c) Disruptiveness.

The mindsets identified in the literature show that consumers develop predispositions to specific circular offerings. It happens because each CBM has its own way of creating, delivering, and capturing value, which, consequently, is perceived differently by consumers, imposing distinct challenges on their acceptance, engagement, and behaviour. Therefore, we advocate that there is no single unified circular consumer mindset. Nonetheless, all identified mindsets reflect CE principles by envisioning benefits for the environment, economy, and society. By favouring circular products and services, valuing material recirculation and multifunctional products, and resisting obsolescence, consumers contribute to the minimisation of resource consumption, reduction of waste generation, and regeneration of the natural environment. Furthermore, these mindsets express consumers' predisposition to engage in disruptive behaviour, walking away from consumption patterns attached to the linear model. Thus, circular mindsets express the willingness to access and use resources in new ways.

These mindsets are expressed through actual behaviour, the actions of consumers that facilitate the transactional processes in consumption systems. 14 behaviours related to circular consumption were identified. Such as circular mindsets, circular behaviour can be associated with the innovation brought about by the CE and fulfil consumers' wishes to test new business models, products, and services.

The mapped behaviour varies in how they address circularity, and in the stage of the consumption system, they can be found. Most circular behaviour is associated with more than one of these stages, thus indicating the complexity of efforts and actions across circular consumption systems. Moreover, circular behaviour can be combined throughout circular consumption systems; for example, acquiring a circular product, caring for it, and then returning it to the manufacturer at the end of its life cycle.

However, not only the combination of circular behaviours but also their continuation throughout the consumption systems creates a circular consumption system. The circulation of resources and minimisation of resource usage can be promoted by single one-off circular behaviours such as waste separation, reuse, and recycling. We believe that systems which are designed to be circular from the start and the engagement of consumers with such systems in the early stages can promote greater positive environmental, social, and economic impacts. Nevertheless, single behaviours that

endorse the return of resources to use and maintain some of their value in the system should not be neglected.

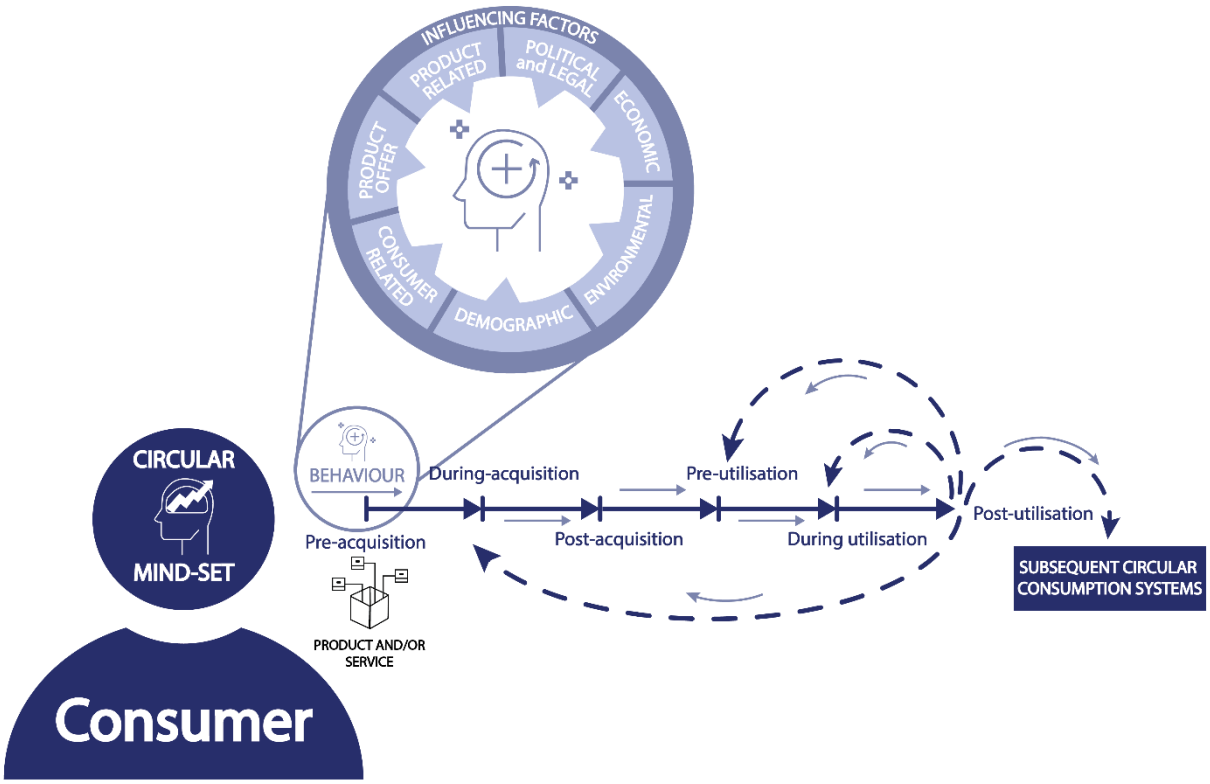
The final step of our SLR was the identification of the factors that positively or negatively influence circular mindsets and behaviour. In the CE literature, we identified 54 factors, which were classified into 7 categories according to their domain. Some categories have received greater attention from the literature, indicating, for example, the number of factors identified, that is, consumer-related, product/service offer, and product/service related, or the number of publications which addressed the factors under these categories, that is, economic and demographic factors. Conversely, studies on political, legal, and environmental factors and their influence on consumer behaviour are very limited in the CE literature, thus indicating that there are opportunities to expand research in these fields.

Nonetheless, many different aspects, from macro-level forces to the availability of a product, can influence how a consumer acts upon their dispositions towards a circular offering. This result shows that the factors that influence consumer acceptance and engagement are extremely diverse. Strategies and interventions which aim to boost consumer engagement should focus on the hard or soft sides of the CE and consumer behaviour, and on a combination of aspects. As important as it is to guarantee a product's quality or offer great customer service, consumers' environmental awareness or attachment to a product, for example, should be equally considered when designing circular offerings. However, greater generalisation should not be established without further investigation. We believe that this list of factors is helpful for researchers and practitioners who wish to narrow their focus, map relevant studies, and evaluate appropriate factors for their research or application context.

4.2. Circular Consumption System Framework

Through SLR, we were able to map important elements that guide consumers' acceptance, adoption, and engagement with circular products and services. These elements, namely mindsets, behaviour, and influencing factors, compose the circular consumption system. However, our SLR shows that the CE literature lacks a framework that shows the integration of these elements and how they, combined, can boost consumer participation in circular systems and consequently enhance the success of circular initiatives. Therefore, we propose a framework that positions these elements along with structural elements and transaction processes in circular consumption systems (Figure 4).

Figure 4: Theoretical framework - Circular consumer mind-sets, behaviour and influencing factors in circular consumption systems.



The circular consumption system is the arrangement of circular consumption stages through which the flow of structural elements (circular products and services) occurs through transactional processes (chained activities performed via consumer behaviour). The consumer, an active actor in a successful circular consumption system, holds dispositions to engage with circular products/services. These mindsets are expressed through behaviour that allows the flow of products in these systems, which, in turn, are affected by influencing factors, among the seven groups identified in the SLR.

We suggest that circular mind-sets are the starting point for understanding the consumer's context. They represent consumers' first impressions of circular products and services, their perception of the value offered by the CE, and the extent to which they are disposed to engage in circular consumption systems. Therefore, circular mindsets are the first component of our theoretical framework, and the first to be mapped and understood when designing these systems.

After understanding and mapping circular mindsets, designers of circular consumption systems should identify the behaviour they want to promote, and the linear behaviour they wish to discourage, in all phases of the consumption chain. The next step is to discern what influences boost or hinder these behaviours and mindsets, namely, the

influencing factors. These aspects, previously classified into seven groups by our framework, illustrate the complexity of designing, altering, and intervening in circular consumption systems. When defining a circular strategy, organisations must be aware that many factors can influence their actual and potential customers, which can be translated into whether and how consumers will engage with their circular initiative. Accordingly, by mapping consumers' mindsets and identifying desirable circular behaviour, the factors that can influence them become clearer.

Our research indicates that, by integrating all these elements, it is possible to achieve a comprehensive analysis of circular consumption. Moreover, by relying on the understanding of circular business models, circular products and services, and consumers' psychological and contextual aspects, organisations can overcome challenges and exploit opportunities that can be translated into circular consumption behaviour and engagement.

4.3. Limitations and future research

Although this study is firmly grounded in CE literature, we indicate a limitation concerning the strings used in the SLR. The use of broader terms, such as 'closed-loop economy' or 'cradle-to-cradle' could have resulted in a wider set of data collected. Furthermore, we limited our search to articles published in peer-reviewed journals. Other types of documents, such as conference papers, could provide additional results to this SLR; however, we believe that this addition could have compromised the quality of this research.

Additionally, even though some of the analysed studies presented statistical/quantitative results concerning the influence of some factors on circular behaviours, we were unable to provide meta-analyses. Often, the methodologies, theories, and context of the study were not the same, thus preventing the generalisation of results.

5. Conclusion

Consumers' circular mindsets express their pre-disposition to engage with circular products and services, and present a disruption in linear behavioural patterns and an alignment with circular principles. However, consumers' mindsets depend on which CBM is addressed by organisations and brands. Consumers' circular behaviours can also depend on the type of product and offering, and their participation in consumption systems can be combined with other circular behaviours throughout the many stages of

the system, or even as a single one-off behaviour. Either way, these circular behaviours promote the flow of products and resources in circular systems.

Additionally, we established that mindsets and behaviour are influenced by several factors in seven domains. These factors have been reported in the literature in specific contexts. Some highly cited factors such as price and environmental awareness presented similar considerations. Overall, consumers reject the products and services they perceive as overpriced; the greater the consumers' environmental awareness, the greater the chance that they engage in circular consumption systems. However, for most of the factors we mapped, generalisation was not possible.

We also found that circular consumption systems rely on consumers' circular mindset and are expressed by circular behaviour, which, in turn, is influenced by sets of intrinsic and extrinsic factors. This study presents a theoretical framework that combines these elements and their interrelations to allow the flow of products, services, and resources through circular consumption systems.

As for the implications for research and practice, we believe that our results can help academics position their research in the existing literature, explore existing findings, and fill the gaps identified. Furthermore, organisations and brands wishing to transition to a CE can use our results and framework to better comprehend the challenges concerning consumer behaviour, that is, understand their consumers' circular dispositions and behaviour, discern consumers' context and individual features, and distinguish the characteristics related to the product/service that fit their consumers' expectations.

For future research, we indicate continued updates on this SLR; as this field gains traction, more countries commit to becoming circular, and more data become available. Moreover, there is a lack of research on consumer behaviour concerning some CBM, such as dematerialisation and digitalisation, which could be addressed by future research. Finally, a structured framework to guide behavioural change among circular consumers should be developed to help businesses implement a CE.

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Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and in The Netherlands

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Abstract: The apparel industry causes environmental problems, particularly due to the shortening life cycle of garments and fast-fashion's throw-away culture. The circular economy provides solutions to minimise and prevent these problems through innovative circular business models, which require changes in consumer behaviours. With the lens of environmental psychology, we analyse consumers' willingness to acquire circular apparel considering four approaches on clothing life-cycle extension. We conducted an online questionnaire among Brazilian and Dutch consumers and tested if the Value-Belief-Norm (VBN) theory can explain the willingness of consumers to purchase circular apparel. Our results indicate that, overall, the variables from the VBN theory explain circular behaviour in the apparel industry and that the paths suggested by the model are supported by our analyses. Additionally, we tested and found that when all of the variables from the VBN theory were controlled for, materialistic values did not explain circular behaviours in the apparel industry among Brazilian respondents. However, they had a positive influence on some circular apparel behaviours among Dutch consumers. Overall, materialistic values did not play an important role in predicting willingness to consume circular clothing. Furthermore, the results suggest that the VBN theory predicts willingness to consume circular apparel better in the Netherlands compared to Brazil, suggesting that this behaviour may be perceived as more effortful for the Brazilian population. However, we highlight the need for future research.

Keywords: circular economy; environmental psychology; consumer behaviour; life-cycle extension; value-belief-norm theory; circular clothing.

1. Introduction

The apparel industry is one of the oldest and largest industries worldwide [1], being responsible for transforming diverse materials into clothing, footwear, and accessories. The apparel industry is of economic, social, and cultural importance [2] but also has a substantial environmental footprint [3]. The environmental impacts associated with the fashion industry are the result of the intensive use of resources, e.g., energy and water, the toxicity of solvents, dyes, and finishes employed, and pollutant processes, e.g., textile treatment [3,4,5,6]. Moreover, the overflow of new trends, the enlarged production by fast-fashion brands, the substantial increase in clothing consumption, and the premature disposal of apparel items increase the amount of textile waste and consequently the expansion of landfills [6,7]. The transition to a circular economy (CE) can decrease this environmental footprint and promote positive effects, namely, economic, social, and environmental benefits [8,9].

The idea of a cyclical ecological system is dated from Boulding [10], which highlights an important circular principle: the considerations of resources' limits and exhaustibility. Spiral (closed) loop systems were then suggested by Stahel [11] as part of a self-replenishing economy, minimising the flow of energy and matter and the environmental deterioration without restraining social and economic growth. However, the Circular Economy terminology came later and can be traced to the work of Pearce and Turner [12] and based on the law of Energy and Matter Degradation (Thermodynamics), advocating that circular systems patterns are essential to sustain human life.

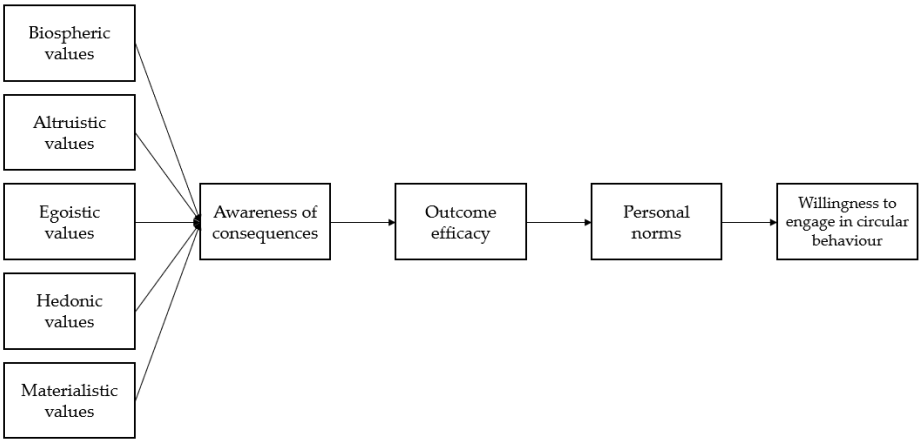
There are different CE definitions across the literature [13,14,15,16]. However, the majority of them share some important features: the CE is related to the minimisation of resource demand and the optimisation of resource and energy recirculation; it is a multi-level approach, it is driven towards sustainable development; and, it is closely related to how society innovates [17]. For this research, we consider the circular economy as a new economic system that aims to prevent the depletion of resources by proposing a change of paradigm in how human society and nature interrelate [17].

Shifting to a circular economy entails shifting to nature-inspired cyclical processes that minimise resource demand [3,17,18] and mitigate excessive consumption [19]. This transition is only possible through innovative circular business models (CBMs). CBMs outline how an organisation operates circularly, by creating, delivering, and capturing value with and within closed material loops [20,21,22]. Specifically, circular business models (CBMs) propose to extend products' life-cycle in four ways [18]: (1) durability, new products are designed to be durable for a long lifetime; (2) facilitated reuse, with or without repair/upgrade; (3) modular design, products are designed to be modular so that parts can be replaced to update/upgrade a product without the need to replace the whole item; and (4) refurbish, repair, remanufacture and recondition, the product gets a next life by restoring the product's functionality to "as-new" quality.

Circular business models, such as extending products' life cycle, imply consumer behavioural changes [23]. Therefore, consumers are key stakeholders in the CE [24], and individual behaviour is critical to the success of circular business models [25]. The challenges embedded in the circular transition involve engaging consumers in circular systems [19,24], and, to promote the circular behaviours of apparel consumers, we first need to understand which factors influence them.

A theory that has been used to explain many pro-environmental behaviours is the Value-Belief-Norm theory (VBN) [26]. The VBN theory explains pro-environmental behaviour by focusing on normative considerations [26,27,28]. Specifically, it focuses on how values, via awareness of consequences, outcome efficacy, and personal norms, affect people's willingness to engage in pro-environmental behaviour, such as circular behaviour (see Figure 1).

Figure 1. The Value-Belief-Norm theory.



The VBN theory has been found to explain many pro-environmental behaviours, including the adoption of alternative fuel vehicles [29], interest in smart energy systems [30], biodiversity conservation [31], and sustainable water consumption [32]. However, to the best of our knowledge, it has not yet been tested if the VBN theory applies to circular apparel consumption behaviour. Hence, this research aims to test if the VBN theory can explain the willingness of apparel consumers to engage in circular behaviours, focusing on those that extend the clothing life-cycle.

Furthermore, we test the VBN theory, including materialistic values, among Brazilian and Dutch consumers. These two countries were chosen because apparel life-cycle extension strategies were reported both in Brazil [33,34] and in the Netherlands [35]; however, they are quite diverse in terms of the availability of circular apparel products and income levels.

2. Literature Review

According to the VBN theory, pro-environmental behaviour (in this case, circular apparel behaviour) is influenced by personal norms [26]. Personal norms reflect intrinsic motivation and are experienced as feelings of moral obligation to perform pro-environmental behaviours (in this case, circular apparel behaviour) [36,37]. Personal norms are generally stronger for people with higher outcome efficacy. Outcome efficacy reflects the belief that their actions can reduce environmental problems [27]. Hence, outcome efficacy reflects the extent to which a person feels they can contribute to reducing environmental problems by purchasing circular apparel [27,37,38]. Outcome efficacy is stronger when people are aware of the environmental problems caused by a particular behaviour [27], i.e., awareness of consequences. Awareness of consequences reflects the extent to which people are aware of environmental problems caused by the fast fashion industry.

Lastly, awareness of consequences is influenced by personal values. Values can be defined as trans situational goals that are guiding principles in people's lives [39]. Specifically, research suggests that awareness of consequences is related to biospheric, altruistic, egoistic, and hedonic values. Generally, biospheric values, which reflect caring about nature and the environment [40], are positively related to awareness of consequences [41]. Altruistic values reflect the extent to which a person cares about humans' welfare [40]. Awareness of consequences is expected to be positively related to altruistic values [26]. On the contrary, egoistic values, which reflect whether people care

about power and wealth [40], are commonly negatively related to awareness of consequences [42]. Hedonic values, which reflect caring about comfort and pleasure [40], are generally negatively related to awareness of consequences [30].

Additionally, we argue that, for circular consumer behaviour, another type of values could be relevant, namely, materialistic values, because they more directly focus on the acquisition of products, such as clothing, and their role in people's pursuit of happiness and success [43]. Materialistic values reflect the centrality of acquisition-related activities in a person's life and how people prioritise possessions over other things [43].

We expect that the willingness to purchase second-hand, modular, and refurbished clothing are positively related to materialistic values, as these products may be prised by people who hold strong materialistic values. On the other hand, we expect that strong materialistic values are negatively related to the willingness to consume fewer but durable products, as consuming fewer products may not be in line with materialistic values. Indeed, previous research suggests that materialistic values are positively related to the purchase of environmentally friendly products [44]. Yet, materialistic values have been found to be negatively related to environmental behaviour when the behaviour constrains the consumption of goods [45]. We will test if and how materialistic values are also related to circular apparel consumption behaviour.

The employment of circular business models, especially the ones that enhance products' life cycles, is an important strategy to minimise the environmental footprint of the apparel industry by tackling garments' superfluous production, excessive consumption, and premature disposal. However, consumer acceptance of circular clothing and their engagement with circular consumption systems are still challenges that must be overcome by circular apparel brands. The VBN theory has been used to explain pro-environmental behaviours; therefore, this paper's goal is to test if the variables and path included in this model can explain the willingness to purchase clothing that is durable, reused, has a modular design, or is refurbished, repaired, remanufactured, or reconditioned.

6. Materials and Methods

6.1. Participants and Procedure

This study aimed to test the VBN theory among Brazilian and Dutch apparel consumers. We developed a questionnaire using validated measures of the VBN theory (see Section 3.2). Furthermore, the different willingness to engage in circular behaviour

measures were based on expert discussions. The questionnaire was developed in English (v1), and the translations to Portuguese and Dutch were carried following the instructions on Forward and Backward translation [46], that is, the authors translated it to both languages and third parties (bilinguals) translated it back to English. These versions were compared to the first one (vI), validating the translations to Portuguese and Dutch.

The two versions of the questionnaire, in Portuguese and Dutch, were digitalised and made available at online platforms, from which the questionnaire was shared after an empirical validation. This validation was carried out by a group of ten circular economy experts and non-experts who tested the survey's content, interface, ease, and difficulty of context and understanding, guaranteeing a clear and user-friendly questionnaire. In the Netherlands, the data were collected via the panel *Panelinzicht*. Participants received a small financial reimbursement for their participation. In Brazil, the questionnaire was made available via social networks (Facebook and LinkedIn) and by e-mail to graduate programmes in all 27 Brazilian federal units (26 states and the Federal District). The participation was voluntary; respondents did not receive monetary incentives.

The answers were collected between September 2019 and February 2020, combining 875 responses, of which 506 were from Brazil and 369 were from the Netherlands. Only the responses from the participants who completed the entire questionnaire were kept in the dataset, resulting in a dataset of 289 participants from Brazil and 272 participants from the Netherlands.

In Brazil, 181 females and 102 males participated in the study, six participants did not indicate their gender. Age ranged from 18 to 73 (M = 33.50, SD = 11.70). About 1.3% of respondents indicated that their monthly net household income was less than 1000 Brazilian reais (BRL) (225 euros), 24% between 1000 BRL (225 euros) and 2999 BRL (674 euros), 22% between 3000 BRL (675 euros) and 4999 BRL (1224 euros), while 45% of the respondents earned more than 5000 BRL (1225 euros) and more than 7% chose not to disclose their income.

In the Netherlands, the gender distribution of participants were 138 females, 132 males, and one transgender; one participant did not answer. Age ranged from 18 to 80 (M = 44.07, SD = 19.66). Around 24% of the sample indicated that their monthly net household income was less than 2000 euros, 43% between 2000 and 4000 euros, and 17% earned more than 4000 euros per month; about 16% did not indicate their income.

6.2. Measures

6.2.1. Values

To measure biospheric, altruistic, egoistic, and hedonic values, we used Steg et al.'s [40] short value questionnaire, based on Schwartz's [39] value questionnaire. Biospheric values were measured with four items (Respecting the earth: harmony with other species; Unity with nature: fitting into nature; Protecting the environment: preserving nature; Preventing pollution: protecting natural resources). We also measured altruistic values with four items (Equality: equal opportunity for all; A world at peace: free of war and conflict; Social justice: correcting injustice, care for the weak; Helpful: working for the welfare of others). Five items were used to measure egoistic values (Social power: control over others, dominance; Wealth: material possessions, money; Authority: the right to lead or command; Influential: having an impact on people and events; Ambitious: hardworking, aspiring). Finally, hedonic values were measured with three items (Pleasure: joy, gratification of desires; Enjoying life: enjoying food, sex, leisure etc.; Self-indulgent: doing pleasant things). Participants indicated on a scale from −1 (opposed to my values) and 0 (not important) to 7 (extremely important) to what extent the value is important to them as a guiding principle in their life.

In Brazil, biospheric values (α = 0.86, M = 5.96, SD = 1.38) and hedonic values (α = 0.70, M = 5.25, SD = 1.72) formed reliable scales, as Cronbach's alpha (α) falls between 0.70 and 0.90. The reliabilities of altruistic values (α = 0.67, M = 6.19, SD = 1.24) and egoistic values (α = 0.69, M = 2.65, SD = 2.40) scales were not optimum for the Brazilian sample. Yet, we decided to keep these items in the scale, as they are based on validated measures. The value scales were reliable in the Netherlands: biospheric values (α = 0.91, M = 4.36, SD = 1.97), altruistic values (α = 0.85, M = 4.81, SD = 1.80), egoistic values (α = 0.81, M = 2.43, SD = 2.08), and hedonic values (α = 0.88, M = 4.65, SD = 1.70).

In addition, we measured materialistic values following Richins' and Dawson's [47] nine indicators scale (I admire people who own expensive homes, cars, and clothes; The things I own say a lot about how well I'm doing in life; I like to own things that impress people; I try to keep my life simple, as far as possessions are concerned; I enjoy spending money on things that aren't practical; I like a lot of luxury in my life; My life would be better if I owned certain things I don't have; I'd be happier if I could afford to buy more things; It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like). Respondents rated each item on a five-point Likert-scale (from strongly disagree to strongly agree). The fourth item was measured as a reverse scale and was therefore

reverse-coded. That way, for all items of the scale a higher score reflects stronger materialistic values. The mean scores and Cronbach's alpha (α) were computed for this scale for the Brazilian (α = 0.78, *M* = 2.42, *SD* = 1.06) and Dutch *(*α = 0.82, *M* = 2.76, *SD* = 1.11) responses.

3.2.2. Awareness of Consequences

Awareness of consequences was measured, based on van der Werff and Steg [48], with three items that assessed the extent to which apparel consumers are concerned with the environmental and social issues caused by the fast-fashion (The production and consumption of fast-fashion causes important problems for society; The production and consumption of fast-fashion cause serious environmental issues; I worry about the social and environmental impacts caused by the clothing/fashion industry). Respondents indicated the extent to which they agreed to the statements using a five-point Likert scale (from strongly disagree to strongly agree). The mean scores and Cronbach's alpha (α) were computed for the Brazilian (α = 0.70, *M* = 3.48, *SD* = 0.78) and Dutch (α = 0.82, *M* = 3.54, *SD* = 0.81) responses.

3.2.3. Outcome Efficacy

Outcome efficacy was measured with one item (If I would reduce my consumption of fast-fashion I would contribute to reducing social and environmental problems caused by fast-fashion) on a five-point scale, from (1) strongly disagree to (5) strongly agree [27]. The mean scores were computed for the Brazilian (*M* = 3.69, *SD* = 1.06) and Dutch (*M* = 3.59, *SD* = 0.97) responses.

3.2.4. Personal Norms

Personal norms were measured with three items (I feel morally obligated to prevent social and environmental harm caused by the textile industry; I feel morally compelled to act to prevent social and environmental harm caused by the textile industry; I feel not obliged to do something to stop social and environmental harm in the textile industry) [26]. Participants could answer on a five-point scale (from strongly disagree to strongly agree) to what extent the statements were true for them personally. The last item was measured as a reverse scale and was therefore recoded. That way, for all items of the scale, a higher score reflects a stronger personal norm. The mean scores and Cronbach's alpha (α) were computed for the Brazilian (α = 0.82, *M* = 3.39, *SD* = 1.08) and Dutch (α = 0.78, *M* = 3.12, *SD* = 1.10) responses.

3.2.5. Willingness to Acquire Circular Apparel

This study focused on four approaches to the life-cycle extension CBM. We measured, with one item each, the willingness of consumers to acquire or try products within these approaches: durability (I am willing to acquire less pieces of garments if they have a longer life cycle; Brazil–*M* = 4.17, *SD* = 0.92*;* Netherlands–*M* = 3.79*; SD* = 0.89), facilitated reuse (I am willing to use second-hand garment; Brazil–*M* = 3.72, *SD* = 1.09*;* Netherlands–*M* = 3.06*; SD* = 1.27), modular design (I am willing to try clothes and footwear with a modular design; Brazil–*M* = 3.99, *SD* = 0.77*;* Netherlands–*M* = 3.40*; SD* = 0.90), and refurbished, repaired, remanufactured, or reconditioned products (I am willing to acquire a new apparel that was refurbished/repaired/remanufactured/reconditioned; Brazil–*M* = 3.97, *SD* = 0.83*;* Netherlands–*M* = 3.12*; SD* = 1.09). The definition and examples of these CBM approaches were made available for the respondents. All items were measured on a five-point scale, from (1) strongly disagree to (5) strongly agree.

6.3. Analyses

The VBN theory and the casual pathways between its variables were tested with a series of regression and mediation analyses [41]. We calculated bootstrapping confidence intervals for multiple-step models to test mediation effects using the PROCESS macro model 6 [49]. To compare the predictive power of the VBN theory for the different dependent variables collected in both countries, Brazil and the Netherlands, we calculated 95% confidence intervals around the R^2 values [50]. We consider R^2 values of the regression model to be significantly different when the overlap of the 95% confidence intervals is less than half the distance of one side of the confidence interval [51].

7. Results

7.1. Correlations

We first tested correlations between all relevant variables for the responses collected in Brazil (grey) and the Netherlands (Table 1).

In Brazil, the willingness to acquire fewer pieces of garments if they have a longer life-cycle was positively and significantly related to awareness of consequences, outcome efficacy, and personal norms and was negatively and significantly related to egoistic and materialistic values. The willingness to acquire second-hand clothing was positively and significantly related to biospheric, altruistic, and hedonic values, as well as awareness of consequences, outcome efficacy, and personal norms, and this outcome variable was

Table 1. Bivariate correlations between all variables among Brazilian (grey) and Dutch consumers.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1 – Biospheric values	-	.77*	.18*	.43*	-.19*	.51*	.44*	.52*	.31*	.19*	.35*	.27*
2 – Altruistic values	.63*	-	.15*	.59*	-.20*	.35*	.32*	.38*	.27*	.07	.20*	.16*
3 – Egoistic values	.03	.01	-	.32*	.55*	.01	.05	.04	-.14**	.04	.10**	.10**
4 – Hedonic values	.24*	.21*	.30*	-	.12**	.03	.04	-.06	.00	-.07	.02	-.01
5 – Materialistic values	-.17*	-.07	.34*	.22*	-	-.15*	-.11**	-.18*	-.19*	.09	.06	.08
6 – Awareness of consequences	.27*	.19*	-.06	.05	-.15*	-	.67*	.68*	.42*	.28*	.40*	.32*
7 – Outcome efficacy	.23*	.18*	.00	.07	-.13**	.58*	-	.60*	.32*	.23*	.44*	.33*
8 – Personal norm	.41*	.30*	-.05	.06	-.18*	.49*	.43*	-	.41*	.25*	.40*	.35*
9 – Willingness (durable garment)	.06	.05	-.10**	.06	-.13**	.31*	.24*	.21*	-	.13	.31*	.24*
10 – Willingness (facilitated reuse)	.12**	.14*	-.16*	.19**	-.03	.21*	.17*	.24*	.25*	-	.45*	.70*
11 – Willingness (modular design)	.02	.05	-.09	.01	-.09	.26*	.21*	.28*	.24*	.47*	-	.54*
12 – Willingness (refurbished etc.)	.15*	.10**	-.14**	.04	-.13	.28*	.24*	.28*	.19	.66	.50	-

* $p < .01$
** $p < .05$

negatively and significantly related to egoistic values. The willingness to acquire clothing with modular design was positively and significantly related to awareness of consequences, outcome efficacy, and personal norms. Lastly, the willingness to acquire apparel that was refurbished/etc. was positively and significantly related to biospheric values, altruistic values, awareness of consequences, outcome efficacy, and personal norms and negatively and significantly related to egoistic values.

In the Netherlands, the willingness to acquire fewer pieces of garments if they have a longer life cycle was positively and significantly related to biospheric and altruistic values, awareness of consequences, outcome efficacy, and personal norms, and was negatively and significantly related to egoistic and materialistic values. The willingness to acquire second-hand clothing was positively and significantly related to biospheric values and awareness of consequences, outcome efficacy, and personal norms. The willingness to acquire clothing with modular design was positively and significantly related to biospheric, altruistic, and egoistic values and awareness of consequences, outcome efficacy, and personal norms. Finally, the willingness to acquire apparel that was refurbished/etc. was positively and significantly related to biospheric values, altruistic values, egoistic values, and awareness of consequences, outcome efficacy, and personal norms.

7.2. VBN Theory

We tested the VBN theory with a series of regression analyses (Table 2) [29,30,31,32]; the results are separated by country and circular business model.

4.2.1. Brazil

The first step of the analyses comprised of a model with awareness of consequences as the outcome variable and values as the independent variables. Biospheric values were positively and significantly related to awareness of consequences; that is, generally, the stronger one's biospheric values, the stronger one's awareness that the production and consumption of fast-fashion causes social and environmental problems is. Altruistic, egoistic, hedonic, and materialistic values were not significantly related to awareness of consequences when the other values were controlled for.

Following this, we analysed a model with outcome efficacy as the dependent variable and awareness of consequences and values as the independent variables. The results indicated that the stronger the awareness of consequences of the problems caused by the production and consumption of fast-fashion, the stronger the feeling that by

Table 2. Regression of consumption intention of circular apparel on the Value-Belief-Norm Theory.

	Brazil (n = 298)									Netherlands (n = 272)								
	β	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**	**β**	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**
DV: Awareness of consequences					.07	[.02 -.14]	5.00	5.46	**<.001 ***					.30	[.21 - .38]	5.00	23.87	**<.001**
Biospheric Values	.23	.05	3.08	**.002**						.60	.04	7.36	**<.001**					
Altruistic Values	.03	.06	.47	.642						.04	.05	.44	.663					
Egoistic Values	-.03	.04	-.55	.583						-.03	.04	-.47	.641					
Hedonic Values	.02	.04	.24	.813						-.24	.04	-3.59	**<.001**					
Materialistic Values	-.10	.08	-1.63	.105						.02	.08	.24	.813					
DV: Outcome Efficacy					.33	[.25 - .41]	6.00	24.72	**<.001**					.45	[.38 - .53]	6.00	38.59	**<.001**
Awareness of consequences	.55	.07	10.97	**<.001**						.60	.06	11.08	**<.001**					
Biospheric Values	.04	.06	.63	.530						.08	.04	1.03	.304					
Altruistic Values	.04	.08	.57	.572						.10	.05	1.21	.228					
Egoistic Values	.04	.04	.70	.484						.04	.04	.61	.542					
Hedonic Values	.03	.04	.51	.611						-.08	.04	-1.32	.190					
Materialistic Values	-.05	.09	-.97	.331						.00	.08	.06	.956					
DV: Personal Norms					.33	[.25 - .41]	7.00	21.59	**<.001**					.57	[.50 - .63]	7.00	53.07	**<.001**
Outcome Efficacy	.18	.05	3.09	**.002**						.20	.05	3.65	**<.001**					
Awareness of consequences	.29	.07	4.89	**<.001**						.38	.06	6.64	**<.001**					
Biospheric Values	.25	.05	3.90	**<.001**						.20	.04	2.87	**.004**					
Altruistic Values	.05	.07	.81	.420						.20	.04	2.75	**.006**					
Egoistic Values	-.01	.04	-.21	.835						.07	.03	1.34	.182					
Hedonic Values	-.02	.04	-.39	.699						-.30	.03	-5.65	**<.001**					
Materialistic Values	-.06	.08	-1.04	.301						-.03	.07	-.50	.620					

***** Statistically significant p-values were highlighted in bold text

	Brazil (n = 298)									Netherlands (n = 272)								
Product life-extension	**β**	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**	**β**	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**
DV: Willingness to acquire less pieces of garments (clothes and footwear) if they have a longer life cycle					.10	[.04 - .18]	8.00	5.02	**<.001**					.22	[.14 - .31]	8.00	1.69	**<.001**
Personal Norms	.07	.07	1.03	.306						.17	.08	2.04	**.043**					
Outcome Efficacy	.07	.06	1.02	.308						.01	.07	.18	.854					
Awareness of consequences	.24	.09	3.26	**.001**						.24	.09	2.81	**.005**					
Biospheric Values	-.09	.06	-1.15	.253						.02	.05	.20	.845					
Altruistic Values	.00	.08	-.03	.979						.17	.06	1.73	.085					
Egoistic Values	-.08	.04	-1.32	.188						-.17	.04	-2.38	**.018**					
Hedonic Values	.10	.09	1.62	.106						-.06	.04	-.73	.465					
Materialistic Values	-.09	.09	-1.39	.166						.02	.09	.21	.836					
Facilitated reuse																		
DV: Willingness to use second-hand garment					.09	[.03 - .16]	8.00	4.45	**<.001**					.11	[.04 - .18]	8.00	4.99	**<.001**
Personal Norms	.16	.08	2.28	**.024**						.06	.12	.64	.525					
Outcome Efficacy	.04	.07	.50	.615						.05	.10	.63	.533					
Awareness of consequences	.10	.10	1.34	.182						.15	.14	1.67	.097					
Biospheric Values	-.03	.08	-.39	.695						.21	.08	2.03	**.043**					
Altruistic Values	.06	.09	.87	.387						-.04	.09	-.35	.725					
Egoistic Values	-.21	.05	-3.34	**<.001**						-.08	.06	-1.12	.264					
Hedonic Values	.13	.05	2.02	**.044**						-.14	.07	-1.73	.085					
Materialistic Values	.06	.11	.93	.356						.23	.14	3.02	**.003**					

	Brazil (n = 298)									Netherlands (n = 272)								
Product modular design	**β**	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**	**β**	**SE**	**t**	**p**	**Adj. R^2**	**95% Ci R^2**	**df**	**F**	**p**
DV: Willingness to try clothes and footwear with a modular design					.10	[.04 - .17]	8.00	4.92	**<.001**					.25	[.17 - .34]	8.00	12.40	**<.001**
Personal Norms	.23	.06	3.32	**.001**						.13	.08	1.57	.118					
Outcome Efficacy	.06	.05	.81	.421						.26	.07	3.56	**<.001**					
Awareness of consequences	.15	.07	2.00	**.047**						.06	.09	.74	.460					
Biospheric Values	-.17	.05	-2.23	**.027**						.26	.05	2.79	**.006**					
Altruistic Values	.04	.06	.57	.566						-.08	.06	-.79	.433					
Egoistic Values	-.07	.03	-1.13	.261						-.03	.04	-.41	.680					
Hedonic Values	.04	.04	.71	.479						-.06	.04	-.82	.416					
Materialistic Values	-.03	.08	-.52	.605						.17	.09	2.53	**.012**					
Refurbished, repaired, remanufactured and reconditioned products																		
DV: Willingness to acquire a new apparel that was refurbished/repaired/ remanufactured/ reconditioned					.10	[.04 - .18]	8.00	5.06	**<.001**					.16	[.09 - .24]	8.00	7.42	**<.001**
Personal Norms	.15	.06	2.22	**.027**						.16	.10	1.90	.058					
Outcome Efficacy	.09	.06	1.26	.207						.16	.09	2.05	**.041**					
Awareness of consequences	.13	.08	1.79	.075						.04	.12	.43	.671					
Biospheric Values	.02	.06	.22	.823						.19	.06	1.96	**.052**					
Altruistic Values	-.01	.07	-.14	.889						-.03	.07	-.27	.790					
Egoistic Values	-.13	.04	-2.09	**.038**						-.02	.05	-.30	.767					
Hedonic Values	.07	.04	1.10	.274						-.09	.06	-1.11	.267					
Materialistic Values	-.04	.08	-.60	.550						.19	.12	2.62	**.009**					

reducing the consumption of these products one would contribute to reducing the social and environmental problems caused by fast-fashion. Biospheric, altruistic, egoistic, hedonic, and materialistic values were not significantly related to outcome efficacy when controlling for awareness of consequences.

At the third step of the analysis, the variance in personal norms was explained by outcome efficacy, awareness of consequences, and values. Personal norms to prevent social and environmental harm caused by the clothing industry were stronger the more one felt the social and environmental problems caused by fast-fashion can be reduced by decreasing the consumption of fast-fashion (i.e., outcome efficacy) and the more one was aware of the problems caused by the production and consumption of fast-fashion (i.e., awareness of consequences). Biospheric, altruistic, egoistic, hedonic, and materialistic values were not significantly related to personal norms when controlling for the other variables in the model.

Step four encompassed a model that explained the variance in the willingness to consume circular apparel. Firstly, we tested the variance in the willingness to consume durable garments through personal norms, outcome efficacy, awareness of consequences, and values. We found that the more one is aware of the social and environmental problems caused by the production and consumption of fast-fashion, the stronger the willingness is to acquire fewer pieces of apparel if they have a longer life cycle. None of the other variables was significantly related to the intention to consume durable garments when all variables were included in the model.

Next, the variance of facilitated reuse was explained by personal norms, outcome efficacy, awareness of consequences, and values. Personal norms were positively related to the intention to use second-hand garments, and egoistic values were negatively significantly related to this willingness. That is, the analysis suggested that the stronger one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry and the weaker one's egoistic values, the stronger the willingness to use second-hand apparel is. Outcome efficacy, awareness of consequences, and biospheric, altruistic, and materialistic values were not significantly related to the willingness to facilitate reuse when all variables were included in the model.

Then, we investigated the willingness to consume products with a modular design as the outcome variable and personal norms, outcome efficacy, awareness of consequences, and values as independent variables. In general, the stronger one's personal norms and awareness of consequences regarding the fast-fashion industry, and the weaker one's

biospheric values, the stronger the intention to try clothes and footwear with a modular design is. Outcome efficacy, altruistic values, egoistic values, hedonic values, and materialistic values were not significantly related to the willingness to use modular design when all variables were included in the model.

Lastly, we analysed the variance in willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel explained by personal norms, outcome efficacy, awareness of consequences, and values. Our results indicate that the stronger one's moral obligation to prevent social and environmental harm caused by the textile industry (i.e., personal norms) and the weaker one's egoistic values, the stronger the willingness to acquire new apparel that has been refurbished, repaired, remanufactured, and/or reconditioned is. Outcome efficacy, awareness of consequences, and biospheric, altruistic, hedonic, and materialistic values were not significantly related to the willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel when all variables were included in the model.

We rerun our analyses including age and gender as covariates. When all variables were included in the model, gender was not significantly related to any of the dependent variables, and age was only significantly related to the willingness to acquire second-hand and refurbished/etc. clothing. The older people are, the more willing they are to acquire second-hand and refurbished/etc. clothing. However, the results regarding the relationship between the variables from the VBN theory and the circular behaviours remained similar.

4.2.2. The Netherlands

The same steps of the analyses were carried out with the data collected in the Netherlands. In the first step, we considered a model in which the variance in awareness of consequences was explained by values. Biospheric values were positively and egoistic values were negatively significantly related to the awareness that the production and consumption of fast-fashion causes social and environmental problems. Altruistic, hedonic, and materialistic values were not significantly related to awareness of consequences.

The second step comprised a model with outcome efficacy as the dependent variable and awareness of consequences and values as the independent ones. The results indicate that, the more one is aware of the problems caused by fast-fashion, the stronger the feeling that by decreasing the consumption of these products one would contribute to reducing the social and environmental problems caused by fast-fashion is. Values were not

significantly related to outcome efficacy when awareness of consequences was included in the model.

Following this, we analysed the variance in personal norms explained by outcome efficacy, awareness of consequences, and values. Outcome efficacy, awareness of consequences, and biospheric and altruistic values were positively and significantly related to one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry, while hedonic values were negatively and significantly related to this feeling of moral obligation. Egoistic and materialistic values were not significantly related to personal norms when the other variables were controlled for.

Step four comprised a model in which the willingness to acquire circular apparel was tested. First, the willingness to acquire durable apparel was the outcome variable, predicted by personal norms, outcome efficacy, awareness of consequences, and values. Generally, the stronger one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry, the stronger one's awareness of the problems caused by fast-fashion, and the weaker one's egoistic values, the stronger one's willingness to acquire fewer pieces of garments if they have a longer life cycle. Outcome efficacy, biospheric values, altruistic values, hedonic values, and materialistic values were not significantly related to the willingness to consume durable garments when awareness of consequences was included in the model.

Then, the model considered facilitated reuse as the dependent variable and personal norms, outcome efficacy, awareness of consequences, and values as the independent variables. Biospheric and materialistic values were positively and significantly related to the willingness to consume second-hand clothes and footwear; that is, generally, the stronger one's biospheric and materialistic values, the stronger one's willingness to use second-hand garments. Personal norms, outcome efficacy, awareness of consequences, and altruistic, egoistic, and hedonic values were not significantly related to the willingness to facilitate reuse when all variables were included in the model.

Next, we analysed the willingness to consume products with modular design as the outcome of personal norms, outcome efficacy, awareness of consequences, and values. The willingness to try clothes and footwear with modular design was stronger the more one felt the social and environmental problems caused by fast-fashion can be reduced by decreasing the consumption of fast-fashion and the stronger one's biospheric and materialistic values. Personal norms, awareness of consequences, altruistic values,

egoistic values, and hedonic values were not significantly related to the willingness to use modular design when all variables were included in the model.

Finally, we analysed the variance in the willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel explained by personal norms, outcome efficacy, awareness of consequences, and values. Generally, the stronger one's feeling of moral obligation to prevent the social and environmental harm caused by the textile industry (i.e., personal norms), the stronger the feeling that by reducing the consumption of fast-fashion one would contribute to reducing the social and environmental problems caused by fast-fashion (i.e., outcome efficacy), and the stronger one's biospheric and materialistic values, the stronger the willingness to acquire new apparel that has been refurbished, repaired, remanufactured, and/or reconditioned. Awareness of consequences and altruistic, egoistic, and hedonic values were not significantly related to the willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel when all variables were included in the model.

When age and gender were included as covariates in the model, gender was significantly related to the willingness to acquire second-hand clothing, and age was significantly related to the willingness to acquire second-hand and refurbished/etc. clothing. Specifically, women were more willing than men to acquire second-hand clothing. Furthermore, the older people are more willing to acquire second-hand and refurbished/etc. clothing. Yet, similarly to the Brazilian results, the findings regarding the relationship between the variables from the VBN theory and the circular behaviours remained similar.

7.3. The Indirect Effect of Biospheric Values on Willingness to Acquire Circular Apparel via the VBN Path

Following this, we conducted mediation analyses to test the relationships in the VBN theory, considering awareness of consequences, outcome efficacy, and personal norms as the mediators [30]. Biospheric values were considered to be the predictor variable, as it was the main value significantly related to the other variables further down the causal chain of the VBN theory [41]. The four DVs, willingness to acquire durable, second-hand, modular, and refurbished/repaired/remanufactured/reconditioned garments, were tested as the outcome variables. This test was conducted for the data collected in Brazil and the Netherlands as well as the dependent variables (willingness items) separately.

For the Brazilian responses, the mediation effect proposed by the VBN theory was supported only for modular and remanufactured garments. The mean indirect effect of

biospheric values on the willingness to try clothes and footwear with a modular design, via awareness of consequences, outcome efficacy, and personal norms (expected path), was positive and significant (a1 × d21 × d32 × b3 = 0.005 with a 95% confidence interval ranging from 0.001 to 0.012). With the same predictor and mediators, the mean indirect effect on the willingness to acquire a new apparel that was refurbished/etc. was also positive and significant (a1 × d21 × d32 × b3 = 0.003 with a 95% confidence interval ranging from 0.000 to 0.009). Willingness to acquire durable garments was related to by biospheric values (predictor) only via awareness of consequences (mediator) (a1 × b1 = 0.054 with a 95% confidence interval ranging from 0.014 to 0.109); the expected path (a1 × d21 × d32 × b3 = 0.002) was not significant, with a 95% confidence interval ranging from −0.002 to 0.008. Additionally, we did not find support, for any of the expected mediators, that biospheric values are related to the willingness to acquire second-hand apparel; thus, the expected path (a1 × d21 × d32 × b3 = 0.004) was not significant, with a 95% confidence interval ranging from 0.000 to 0.013.

Regarding the Dutch responses, the mediation effect proposed by the VBN theory was supported only for durable garments. Considering the same predictor and meditators (expected path), the mean indirect effect of biospheric values on the willingness to acquire fewer garments if they are more durable was positive and significant (a1 × d21 × d32 × b3 = 0.007–95% CI from 0.001 to 0.016). Willingness to try clothes and footwear with a modular design was influenced by biospheric values (predictor) via awareness of consequences and outcome efficacy (mediators) (a1 × d21 × b2 = 0.043 with a 95% confidence interval ranging from 0.018 to 0.074); the expected path (a1 × d21 × d32 × b3 = 0.005) was not significant, with a 95% confidence interval ranging from −0.002 to 0.014. We did not find support, for any of the expected mediators, that biospheric values influence one's willingness to acquire second-hand (a1 × d21 × d32 × b3 = 0.004–95% CI from −0.006 to 0.016) and refurbished/etc. (a1 × d21 × d32 × b3 = 0.008–95% CI from −0.001 to 0.020) garments.

8. Discussion

This study aimed to test if the VBN theory could explain the willingness of Brazilian and Dutch apparel consumers to engage in circular behaviours that promote the extension of clothing life-cycles. By extending garments' usability and use, the requirement for new apparel diminishes and resources are optimised. That way, environmental problems caused by the apparel industry can be reduced. We also included materialistic values in

the VBN theory, as materialistic values may be particularly relevant for choices in the apparel domain.

Overall, our results show that the variables included in the VBN theory are relevant for explaining circular behaviour in the apparel industry. The correlational analyses indicate that most variables from the VBN theory are associated with the willingness to consume circular clothing. Moreover, we found that, in general, stronger biospheric values were related to a stronger awareness of problems caused by fast-fashion. A stronger awareness of consequences was in turn related to stronger feelings that reducing one's fast-fashion consumption reduces problems caused by fast-fashion (i.e., outcome efficacy). Outcome efficacy was related to stronger personal norms. That is, the stronger one's outcome efficacy, the more one felt morally obliged to prevent harm caused by the textile industry. Personal norms were in turn related to a stronger willingness to engage in circular apparel behaviours in Brazil and the Netherlands. Additionally, the mediation analyses showed that there is support for the path suggested by the VBN theory. That is, biospheric values are related to consumer behaviours towards circular apparel via awareness of consequences, outcome efficacy, and personal norms. Our findings are in line with the literature on the VBN theory [26,41]. Previous research has found support for the VBN theory in explaining pro-environmental actions, such as the interest in smart energy systems [40] and the acceptability of energy policies [41]. However, to our knowledge, this is the first time the VBN theory has been applied to circular apparel consumption.

Yet, in some cases, we did not find that biospheric values are related to circular consumption via all the variables from the VBN theory. This result differs from the literature [40,41] on the VBN theory [26,28], suggesting that further investigation should be carried out to confirm these results and their implication for circular behaviour research. For example, future research could include larger sample sizes to test the full VBN theory path.

Importantly, we found support for the VBN theory in explaining circular apparel behaviour in Brazil as well as in the Netherlands. However, interestingly, we found that the VBN theory explained all four circular behaviours better among Dutch consumers than among Brazilians. The VBN theory includes normative factors to explain behaviour [28]. That is, the model includes factors that focus on engaging in circular apparel behaviour because it is the right thing to do. Generally, normative factors are more strongly related to behaviours that are not too easy, nor too difficult [26]. Therefore, our

findings could potentially be explained by differences in how easy or difficult it is for Brazilian versus Dutch consumers to purchase circular apparel in their country. Specifically, circular apparel brands in Brazil are still niches and have not reached the mainstream level [34], while the Dutch apparel industry is known for its innovative features and efforts in exploring circular strategies and business models [35]. Therefore, it may be a bit easier to purchase circular apparel in the Netherlands, while it may be relatively difficult to purchase circular apparel in Brazil. Furthermore, socio-economic indicators, such as the gross domestic product per capita (Brazil, 2020–US$6796.84; Netherlands, 2020–US$52,304.06) [52] and the Gini index (Brazil, 2018–0.539; Netherlands, 2018–0.281) [53], show there are significant differences between Brazil and the Netherlands concerning to the extent to which people may be able to afford circular apparel. Given both countries' backgrounds on circular economy initiatives and socio-demographic contexts, circular apparel is probably more available and affordable to an average Dutch consumer than for an average Brazilian consumer, which would mean that consuming circular apparel is perceived as more effortful for the Brazilian population. Future research is needed to systematically test if the VBN theory indeed better predicts circular apparel behaviour when the behaviour is somewhat easier compared to when the behaviour is rather difficult. For example, future research could explicitly test how easy or difficult it is for consumers in different countries to acquire circular apparel and whether this explains differences in the extent to which the VBN model explains circular apparel behaviour.

In contrast to our expectations, materialistic values were not, in general, important predictors of the willingness to engage in circular apparel behaviours. Although materialistic values have been found to influence other consumer behaviours, such as energy/water consumption and purchase of environmentally friendly products [44,45], they were also reported to not influence slow-fashion consumption [54], which matches our results. We expected that materialistic values would be positively related to the willingness to purchase second-hand, modular, and refurbished clothing because these products may be seen as luxury products. People with strong materialistic values generally like to own luxury products. However, we found that materialistic values were not significantly related to the willingness to consume these products, neither in Brazil nor in the Netherlands. Perhaps people do not evaluate second-hand, modular, and refurbished clothing as luxury products. Future research is needed to test this. We expected that materialistic values would be negatively related to the willingness to

purchase fewer but durable products because people with strong materialistic values care about acquiring products. We indeed found that materialistic values were negatively and significantly related to this behaviour in both countries, yet this result was no longer supported when the other VBN variables were included in the model as well. Therefore, materialistic values do not seem to play a very important role in explaining engagement in circular apparel behaviour. However, future research is needed to replicate our findings.

8.1. Limitations and Future Research

Although we generally found support for the VBN theory in explaining circular apparel behaviour, the explained variance was rather low. Specifically, the model explained 10% to 25% of the variance in circular apparel behaviours. Circular consumer apparel behaviour is likely to be influenced by other factors as well, such as costs and convenience. Future research is needed to evaluate the influence of these other variables in explaining circular apparel behaviour.

As explained above, we found that the VBN theory explained circular apparel behaviour better in the Netherlands than in Brazil. These differences could be due to differences in the ease or difficulty to consume circular apparel in these two countries. Yet, our sampling method also differed in the two countries. Specifically, in the Netherlands, participants were invited to participate in the study via a panel and received a small financial reward. In Brazil, we used a snowballing technique. The different sampling methods could have led to differences between the samples. Our goal was to test and replicate the generalisability of the VBN theory for circular behaviour in both countries; therefore, we did not use representative samples. Yet, it is important to note that the differences between our samples could be due to country differences or due to differences caused by the different sampling strategies. Therefore, conclusions at a national level should be analysed carefully. Furthermore, we recognise that there is an opportunity to extend this research by expanding the sample representativeness and minimising the differences in data collection among countries.

Finally, we highlight that actual consumption behaviour was not measured, but the willingness to acquire circular apparel was. Although the willingness to acquire circular apparel is likely to be related to the actual acquisition of circular apparel, it is not the same. Future research should test if long term interventions addressing the VBN variables result in changes in consumer engagement with circular clothing, measuring, for example,

consumers' gradual substitution of traditional apparel for circular ones (in the number of pieces replaced) or changes in the clothing's overall durability.

8.2. Practical Implications

Overall, we found that the VBN theory is related to circular consumer apparel. Therefore, brands and decision-makers could target the factors from the VBN theory through interventions, campaigns, and policies to increase circular apparel consumption. Specifically, they could make consumers aware of the problems caused by the textile industry and indicate what consumers can do to reduce these environmental problems. For example, informational campaigns could be set up through which people are informed about these problems via social media. Furthermore, shops that sell circular apparel could inform consumers that by purchasing circular apparel they contribute to reducing environmental problems caused by fast-fashion. That way, environmental awareness of the problems caused by the linear apparel industry and outcome efficacy can be strengthened, which can, in turn, strengthen the personal norm and thereby promote circular clothing consumption. Future research is needed to test whether such interventions can indeed promote actual circular apparel consumption.

9. Conclusion

Our research investigated, in Brazil and the Netherlands, the extent to which the VBN theory explains the willingness to consume apparel with an extended life-cycle.

The suggested VBN path, i.e., biospheric values are related to a stronger awareness of consequences, which positively influences outcome efficacy and thereby enhances personal norms and further circular consumption behaviour, was supported in both countries. We found support for the VBN theory in explaining different types of circular apparel behaviour, focusing on the approaches of clothing life-cycle extension. However, in contrast to our expectations, we did not find that materialistic values are important predictors of consumer behaviour towards circular apparel.

Our findings suggest that the variables from the VBN theory should be targeted by organisations when designing strategies and interventions to enhance consumer engagement in circular consumption systems. For example, campaigns could promote the awareness of apparel consumers regarding the environmental and social impacts caused by fast-fashion production and consumption. Furthermore, these campaigns could specify what consumers can do to reduce these problems e.g., consuming circular clothing.

Overall, that consumer engagement and behaviour are of extreme importance in the acceptance, transition, and success of the circular economy. Consequently, knowing and measuring the factors that influence these behaviours is crucial to circular economy researchers and practitioners, hence the relevance of the VBN theory for this field.

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Consumer engagement in circular consumption systems: a roadmap structure for apparel retail companies

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Abstract Organizations that adopt circular business models, such as apparel brands, must overcome barriers on many levels, including the lack of consumer engagement. We gathered data from different stakeholders in the Brazilian apparel value chain and we conducted interviews with circular apparel brands to support the development of a roadmap structure that guides brands in engaging their consumers. The roadmap structure has three layers, consumer behavior, business model design and communication and marketing strategies, and provides sets of activities that contribute to the success of circular transition in apparel brands, by supporting short and long-term changes in consumer behavior through cohesive processes of product development and promotion. We advocate that this tool can be used by apparel retail companies that operate in circular production and consumption systems.
Keywords: circular economy; grand challenges; consumer behavior; circular business model; communication and marketing.

INTRODUCTION

The circular economy (CE) is founded on the recognition of the world as a ‘system’, where resources and energy are limited (Bocken, Pauw, Bakker, & van der Grinten, 2016) and waste and pollution are design flaws (EMF, 2022). The idea of circular economy can be traced to the work of Pearce and Turner, from 1989 (Ghisellini, Cialani, & Ulgiati, 2016), which advocates that circular

systems patterns are essential to sustain human life (Pearce & Turner, 1989). Therefore, the CE, by employing efficiency efforts in production and consumption systems, proposes changes to the economic logic (Stahel, 2016).

Until recently, the linear pattern found in neoclassical economy dictated economic development. This pattern is based on the allocation of materials, energy, and other resources according to market demands without taking into consideration the exhaustibility and finitude of natural resources (Ghisellini et al., 2016), threatening our future stability (Esposito, Tse, & Soufani, 2015). CE emerges as an alternative to this traditional take-make-dispose linear economy (Bocken, Olivetti, Cullen, Potting, & Lifset, 2017), by proposing a nature-inspired cyclical process, through the extension of resource usage, minimization of waste generation, and closed loops in industrial ecosystems (Stahel, 2016), for example. Therefore, the circular economy focuses on benefiting society by redefining the concept of growth (EMF, 2017a).

The circular economy, by providing solutions to environmental and social challenges, requires collaborative efforts and a systematic perspective addressing grand challenges (GC), i.e., 'specific critical barrier(s) that, if removed, would help solve an important societal problem with a high likelihood of global impact through widespread implementation' (George, Howard-Grenville, Joshi, & Tihanyi, 2016, p. 1881). However, the uniqueness and disruptiveness of the circular economy transition, which involves business model and design innovation as well as complex resource management (Ritzén & Sandström, 2017), led to difficulties for scholars and practitioners to conceptualize, comprehend, and implement this holistic model.

The challenges concerning CE transition are varied, from hard factors (e.g., technical and financial) to soft factors (e.g., regulatory and cultural) (Jesus & Mendonça, 2018), requiring a new way of thinking and doing business (Bocken et al., 2016). Innovative entrepreneurship, i.e., the creation of new products, services, production methods, or business models (Bradley, Kim, Klein, McMullen, & Wennberg, 2021), is, thusly, critical for the circular economy's success. A circular business model (CBM) is the rationale of how an organization creates, delivers, and captures value with and within closed material loops (Mentink, 2014), and guides the development of products and services to achieve CE goals.

Moreover, besides the development of technologies, products, and business models, Stahel (2016) highlights that the communication of strategies and raising awareness of manufacturers and the public are important allies of the realization of the circular economy. Communication and

marketing activities are particularly relevant for transmitting information between companies and their consumers. Marking strategies, for instance, are designed to both inform and convince, eliciting emotive concerns that are more successful than factual communications (Chamberlin & Boks, 2018), and persuasive communication has been previously found to influence circular consumer behavior and support the CE transition (Muranko, Andrews, Newton, Chaer, & Proudman, 2018; Muranko, Andrews, Chaer, & Newton, 2019).

Besides raising awareness of environmental and social issues and communicating how circular initiatives address these challenges, how value is perceived by people, especially consumers, needs to change (Stahel, 2016). Innovation brought by the circular economy, particularly CBMs, imply on mindset and behavioral changes from the consumers and users of circular products and services (Quinones & Augustine, 2015). The acceptance of circular products has been indicated as a key barrier to be overcome by circular organizations (Camacho-Otero, Boks, & Pettersen, 2018), associating the success of CE initiatives with consumers' willingness to behave accordingly to the circular economy principles (Daae, Chamberlin, & Boks, 2018).

Accordingly, this research targets the integration of these three topics, (*i*) challenges concerning consumer acceptance, especially circular mindsets and behaviors, (*ii*) circular business model innovation, and (*iii*) communication and marketing efforts towards the circular economy; as we believe they encompass important considerations for consumer engagement in circular consumption systems.

Additionally, this paper focuses on how these topics interrelate in the context of the transition to a circular fashion. The apparel industry is one of the oldest and largest industries in the world (Keane & te Velde, 2008), and is responsible for critical environmental impacts, e.g. use of solvents and toxic materials (Claudio, 2007) and premature disposal of goods (Armstrong, Kang, & Lang, 2018, EMF, 2017b), and social impacts, e.g., low wages and unhealthy work conditions (Keane et al., 2008). These challenges, therefore, push the apparel industry toward the investment in innovation that incorporates sustainability. Adopting a systematic and holistic view and developing new business models are important steps toward this innovation process, and both could be made feasible through a transition towards circular economy (McKinsey & Company, 2017).

Palm, Cornell, & Hayha (2021) highlight that, due to being hugely globalized, the apparel industry contributes to negative environmental changes at a planetary scale, and part of its challenge is to recognize the dimension of its effects. Consequently, leading to rethinking the scope of the apparel

industry's responsibilities and relationships, widening the focus of business activities (Palm et al., 2021). The transition to circular apparel industry, by tackling a grand challenge, requires a coordinated and sustained effort from multiple and diverse stakeholders, and comprises solutions that modify organizational routine practices and individual and societal behaviors (George et al., 2016).

Therefore, we aim to tackle the following research question:

- How can apparel retail companies facilitate consumer engagement in circular consumption systems?

This paper proposes a roadmap for apparel companies to help them engage their current and potential consumers with circular products and services, by combining theoretical and practical findings on consumers' mindsets and behaviors, business model innovation, and communication and marketing toward a circular economy.

LITERATURE REVIEW

Circular mindsets and behaviors

Circular mindsets and behaviors are part of circular consumption systems, that is, systems that allow the stream of circular offerings. Circular mindsets are the pre-dispositions that consumers hold to participate in these consumption systems (Gomes, Moreira, & Ometto, 2022a), which are expressed through circular behavior(s), that is, behaviors that promote resource efficiency and the flow of circular value (Muranko et al., 2018). Consumers' mindsets vary according to which CBM is being addressed (Gomes et al., 2022a), including: favoring the acquisition and utilization of circular products (Calvo-Porral & Levy-Mangin, 2020; Russo, Conferente, Scarpi, & Hazen, 2019); favoring access instead of ownership (Barbu, Florea, Ocarca, & Barbu, 2018; Tunn, Fokker, Luijkx, Jong, & Schoormans, 2019); valuing participation in material recirculation (Botelho, Dias, Ferreira, & Pinto, 2016; van der Laan & Aurisicchio, 2019); favoring digital and shared circular services (Camacho-Otero, Boks, & Pettersen, 2019; Poppelaaresm, Bakker, & van Engelen, 2018); resisting to obsolescence (Chamberlin et al., 2018; Haines-Gadd, Chapman, Lloyd, Mason, & Aliakseyeu, 2018); and, valuing multi-functional products (Kasulaitis, Babbitt, & Tyler, 2020).

Consumer behavior can also be associated with CBMs, such as acquiring recycled, remanufactured or reconditioned products (Baier, Rausch, & Wagner, 2020; Mugge, Jong, Person, & Hultink, 2018) or adopting use-oriented products and services (D'agostin, Medeiros, Vidor, Zulpo, &

Moretto, 2020; Mashhadi, Vedantam, & Behdad, 2019), and they can emerge in different stages of the circular consumption system, for instance in the pre-acquisition, e.g. reduce consumption, or in the post-utilization, e.g., return products at their end of life (Gomes et al., 2022a).

Moreover, literature reviews in the CE field (Camacho-Otero et al., 2019; Gomes et al., 2022a) show that consumers' engagement and behavior toward circular products and services are influenced by several factors. Camacho-Otero et al. (2019) investigated factors concerning product-service systems (PSS) and sharing economy and they identified 29 factors, categorized into economic, demographic, psychosocial, cultural, and socio-material topics. Gomes et al. (2022a) investigated factors related to any circular behavior and identified 54 factors concerning seven categories, political and legal, economic, environmental, demographic, consumer-related, product/service offer, and product/service-related.

Frameworks, tools, and strategies that associate these influencing factors and consumer behavior have been developed to enhance CE implementation, such as designing for product care (Ackermann, 2018) and durability (Haines-Gadd et al., 2018), interpreting online communication (Chamberlin et al., 2018), and facilitating behavioral change (Muranko et al., 2018). However, to the best of our knowledge, the CE literature lacks a structured framework to guide businesses to promote circular behaviors among their consumers combining reflections on consumers' mindsets and behaviors, business model innovation, and communication and marketing toward a circular economy.

Circular mindsets and behaviors in the apparel industry

Research focusing on circular mindsets, as antecedents of circular behavior, has not been deeply addressed in the apparel and fashion context. Calvo-Porral & Levy-Mangin (2020) indicated that clothing consumers present pre-dispositions to acquire circular products prior to performing circular behaviors; and favoring the access of clothing and sharing them have been highlighted as important antecedents of access-based business models, which propose innovative forms of consumption (Chamberlin et al., 2018), that is, satisfying consumption needs while complying with CE principles (Camacho-Otero et al., 2019).

On the other hand, investigations on consumers' behavior towards circular offerings are gaining traction in the CE literature (Camacho-Otero et al., 2018; Gomes et al., 2022a), including research focused on apparel products and services. However, Hvass & Pedersen (2019) and Singh, Sung, Cooper, West, & Mont (2019) indicate that the apparel industry consumers lack awareness,

acceptance, and engagement in circular activities. According to Palm et al. (2021) this is the outcome of an excessive focus on the materiality of sustainable and circular apparel solutions, putting aside people's, primarily consumers, needs and desires.

The decisions concerning apparel acquisition, utilization and disposal are the results of the combination and interaction of several factors, such as consumers' norms and values, socio-demographic conditions, and fashion trends (Palm et al., 2021). Nencková, Pecakova, & Sauer's (2020) research, for instance, showed that many demographic features (gender, age, level of education, income, and number of household members) can explain different behaviors toward textile waste separation. Gazzola, Pavione, Pezzetti, & Grechi's (2020) research reached similar results and revealed that women show more interest in sustainable fashion. Environmental awareness and ethical and social concerns have also been indicated to influence circular apparel usage, such as sharing (Khan & Rundle-Thiele, 2019) and swapping (Camacho-Otero, Pettersen, Boks, 2020). Barriers to repairing and mending have been associated with a lack of time and skill (Diddi & Yan, 2019).

Niinimäki et al. (2020) suggest that apparel consumers and users do not make decisions solely based on material sustainability and, therefore, sustainable design should be approached from consumers' viewpoint, that is, consumers' intrinsic factors should be at the core of the design. Thus, the implementation of CE in the apparel industry needs to reach these deeper cultural levels (Palm et al., 2021).

Circular business models

A business model (BM) is defined by Richardson (2008) as the conceptual and architectural implementation of a business strategy and the foundation for the implementation of business processes. That is, the BM describes the 'system of interdependent activities performed by a focal firm and its partners and the mechanisms that link these activities to each other' (Amit & Zott, 2015, p.331).

BMs can also be described based on systematic and synergic configurations of interchangeable elements (Spieth, Schneider, Clauß, & Eichenberg, 2019), outlining how an organization operates its enterprise, creating, delivering, and capturing value (Osterwalder & Pigneur, 2010). These BM elements consist of factors concerning the offering, market, competitive strategy, business scope, how the organization makes money, and internal capabilities (Morris, Schindehutte, & Allen,

2005). The performance of a BM does not depend solely on the content of these individual components, but also on the fit between them (Hamel, 2000).

Additionally, the business model design takes into consideration the needs and expectations of multiple stakeholders, beyond the organizations and their customers (Amit et al., 2015). Four drives have been identified to affect BM design: *goals to create and capture value*, focus on creating value for all business model stakeholders; *templates of incumbents*, awareness of existing BM templates and evaluation of their pros and cons; *stakeholders' activities*, cooperation among stakeholders to the development of a unique solution; and, *environmental constrains*, the constrains in which the BM is embedded, e.g. cultural, legal and economic (Amit et al., 2015).

Innovation in business model design toward circularity can emerge from an organization's commitment to sustainability, allowing the identification of new opportunities and competitive advantages due to differentiation (Klein, Spieth, & Heidenreich, 2021). A CBM is based on utilizing economic value retained in products after use in the production of new offerings as its conceptual logic (Linder & Williander, 2017), therefore, CBM enables economically viable ways to continually reuse products and materials, using renewable resources where possible (Bocken et al., 2016).

Bocken et al. (2016) suggest that there are two groups of strategies concerning CBM, the first focusing on slowing loops and the second focused on closing loops. The first group (slowing loops) encompass four strategies: *access and performance*, satisfying user needs without the need of owning physical products; *extending product value*, exploiting the residual value of products; *classic long-life*, offering products with high durability and easy repair; and *encourage sufficiency*, solutions that decrease end-user consumption. The second group (closing loops) include two strategies: *extending resource value*, exploiting the residual value of materials and resources; and, *industrial symbiosis*, using residual outputs from one process as feedstock for another process.

Similarly, the British framework for implementing the principles of the CE in organizations (BSI, 2017) presents six groups of CBM: *on-demand*, providing an offer only when its demand has been confirmed; *dematerialization*, replacing physical products with virtual/digital ones; *product life-cycle extension/reuse*, extending the life-cycle of products by designing for durability, repair, modularity and/or refurbishment; *recovery of secondary raw materials/by-products*, creating products, in open or closed loops, from secondary raw materials/by-products and incentivizing take-back systems; *product as a service/product-service system (PSS)*, leasing products or offering

them based on performance; *sharing economy and collaborative consumption*, sharing products/resources between users/organizations.

CBMs have been conceptualized by Lewandowski (2016) in eleven building blocks, that is, elements that allow the designing of a business model according to the CE principles (Table 1).

TABLE 1 Building blocks of Circular Business Models (Lewandowski, 2016)

Building blocks	Definitions
Partners	Cooperative networks and partnerships that support the Circular Economy.
Activities	Practices aligned with the Circular Economy goals, such as optimizing resource efficiency and designing circular products and services.
Key resources	Suppliers and materials that allow circular flows.
Value proposition	Offer products and services within the strategies of CBM (e.g., product life-cycle extension).
Customer relations	Strategies to communicate with customers and establish relationships with them.
Channels	Channels used to capture and deliver value and communicate with stakeholders.
Take-back systems	Systems that include the reserve logistics of products, including appropriate channels and communication strategies.
Customer segments	Identification of customer types, directly linked with value proposition.
Cost structure	Criteria and principles to evaluate financial changes in Circular Business Models.
Revenue streams	Value captured by the organization in the form of Circular Business Models.
Adoption factors	Organizational capabilities and external factors related to the implementation of Circular Business Models.

Circular business models can be driven by a range of internal levers (e.g. good leadership, availability of resources, and implementation of circular practices) and external levers (e.g. customer demand, governmental incentives, and facilitating infrastructure), however, businesses transitioning to the CE should be aware of barriers that hinder the emergence of CBMs, such as financial risks, lack of availability of technology/resources, absence of collaboration among stakeholders, and lack of consumers' awareness and involvement (Hina, Chauhan, Kaur, Kraus, & Dhir, 2022).

Communication and marketing approaches for a Circular Economy

Increasing environmental challenges together with irresponsible consumption and production practices call for marketing research focused on sustainability (Voola, Bandyopadhyay, Azmat, Ray, & Nayak, 2022). The literature on consumer behavior shows that providing consumer

knowledge on the environmental benefits of circular products and promoting consumers' environmental awareness (Botelho et al., 2018; Gomes, Moreira, Bouman, Ometto, & van der Werff, 2022b; Wang & Hazen, 2016) can influence their willingness to engage in circular consumption systems and, consequently, their behavior towards circular products and services (Gomes et al., 2022a). Therefore, the marketing and communication field, which studies the influence on human culture to stimulate attention, interest, desire, and action (Chamberlin et al., 2018), is fundamental for the promotion of CE.

A review on the relationship between marketing studies and sustainability showed that the greater portion of papers published concerning consumer-level marketing approaches concerns sustainable production and consumption, focusing on consumer behavior; while firm-level marketing studies focused on identifying market opportunities, designing products, networking/partnering, sustainability-oriented marketing strategies, and trade-offs (Voola et al., 2022).

Chamberlin et al. (2018) investigated online communication practices and how they can help companies promote CBMs, by tackling specific factors found to influence consumers' behavior (e.g. fear of contamination, convenience and availability). Their results show that strategies vary according to which factor they want to address, from simple and clear messages that elicit convenience (e.g. 'free shipping') to creating a familiar atmosphere to business models that might be unknown to consumers (e.g. PSS), and also depending on the characteristics of consumers' groups.

Individual value, for instance, has been found to influence people's response to wastewater products, e.g., recycled water and plant pottery (Judge, de Hoog, Perlaviciute, Contzen, & Steg, 2021). According to Judge et al. (2021), these products can be promoted to people who hold strong biospheric values by emphasizing, in product messages, positive environmental consequences. The success of marketing strategies, especially those focused on sustainable or circular products, can be related to how messages are framed, that is, tailoring them according to consumers' intentions and behaviors and evoking their values (Chamberlin et al., 2018; Judge et al., 2021).

Additionally, Gręboszc-Krawczyk & Siuda (2019) found that an effective marketing communication strategy is essential for engaging consumers in circular take-back as a way to raise consumer awareness of the benefits of the circular flow of resources and to publicize the existence of circular initiatives, such as recycling campaigns.

Moreover, the use of labelling schemes has been studied as a strategy to overcome barriers concerning consumers' perceptions, such as quality and performance, of circular products (Gåvertsson, Milios, & Dalhammar, 2020). Although this strategy is perceived as important for guiding consumers' acceptance and engagement with circular products, companies and sectors face impediments to establishing such labelling schemes, like financing, collaboration among stakeholders, especially between public and private sectors, and a comprehensive, unified and clear scope (Gåvertsson et al., 2020).

METHODOLOGY

This paper is the outcome of a PhD research which has the overall objective to develop a roadmap to guide consumer engagement for circular economy solutions in the apparel industry. This research began with the categorization of the apparel industry in Brazil, where the research was conducted. During this initial step, we draw a multi-level perspective scenario, based on Geels (2002), and identified the main barriers and windows of opportunity for the transition to a CE in the Brazilian textile and apparel industry (Gomes, Moreira, Iritani, Amaral, & Ometto, 2021).

With the focus on consumer engagement defined, the confirmation of cultural inertia and little consumer awareness as a barrier to the CE transition in Brazil, and the evidence, from stakeholders in the apparel industry value-chain, that the development of circular mindsets could be a window of opportunity for circular initiatives (Gomes et al., 2021) we continued our research through a systematic literature review for the identification of consumers' mindsets and behaviors related to the circular economy, the factors that affect them, and the determination of their role in circular consumption systems (Gomes et al., 2022a).

Our results show that circular consumption systems are realized by the circular flow of products and resources through chained behaviors, that are guided by circular mindsets and influenced by a varied number of contextual and intrinsic factors (Gomes et al., 2022a). Some of these factors were tested among Brazilian and Dutch consumers, to assess if the Value-Belief-Norm Theory (Stern, Dietz, Abel, Guagnano, & Kalof, 1999) could explain the willingness of apparel consumers to engage with circular products, a hypothesis that we were able to support (Gomes et al., 2022b).

Until this point, we collected data from the CE literature, stakeholders in the apparel value chain (e.g., researchers, suppliers, associations, etc.) and apparel consumers. Therefore, this paper gathers the results from this previous research and complements the perspective of apparel

companies on consumer behavior, BM design and communication and marketing efforts towards a circular economy, translated into a roadmap.

Interviews

The data collection with apparel companies occurred through semi-structured interviews. This methodological approach is commonly used to collect qualitative data, primarily because of its versatility and flexibility (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). Fylan (2005) defines semi-structured interviews as conversations that are structured by a set of open and instigating questions, and that are free to vary according to the participants, that is, enabling improvised follow-up questions based on participants' answers (Kallio et al., 2016).

There are three main steps to conducting semi-structured interviews: (*i*) evaluate previous research on the intended topic, as the questions are based on previous knowledge; (*ii*) identify the sample population, that is, who you are interested in talking to; and (*iii*) develop the interview schedule, the list of questions that will be addressed during the interview, including a logic order (Fylan, 2005).

The first step for conducting our semi-structured interviews was completed in the previous phases of the PhD development, gathering comprehensive information on the apparel sector in Brazil and the opportunities and barriers for the engagement of apparel consumers in the CE. Following, we defined the criteria for the involvement of apparel companies in this study: companies that commercialize circular apparel products (under any approach of CBM), that communicate their efforts towards the CE, and that operate in Brazil. Lastly, we developed the interview schedule (available as a complementary file), which was divided into the three main topics: circular business model, communication and marketing, and consumers' profile (sociodemographic and psychological factors).

The interviews were carried out in January and March of 2022, virtually and in Portuguese, with the founder and owner of Company A and the sustainability manager of Company B. Company A was founded in 2018, and it has one physical store, located in the state of São Paulo – Brazil, and online channels for sales. Company A promotes timeless, versatile, sustainable, and vegan women's clothing, it sources fabric considering sustainability factors (types of materials, reliability of producers, etc.), and it values the local workforce, as the designs are developed by the owner and the assembly is done by seamstresses from the same location as the physical store.

Company B groups 17 apparel brands and two platforms, with more than 500 physical stores across all Brazilian states, working with a wide range of clothing, footwear, and accessories items. The company was founded in the 1970s, as a single brand, and became a corporation in the 2000s with the fusion of two brands. 10% of what is commercialized by Company B is produced by them, the remaining is outsourced to suppliers located within a 50 Km radius from the company's headquarters. Currently, of the 19 initiatives, three on them (B1, B2 and B3) strongly incorporate circular economy principles and adhere to CBMs. B1 is an online platform for selling and buying second-hand apparel, focused on luxury brands. B2 has a menswear collection with products made from recycled cotton, fabric scraps, and post-use jeans. And B3 sells footwear 100% carbon neutral, which some of them are also vegan.

We chose these different companies to compare their approaches on our three focus themes (business model design, communication and marketing, and consumer behavior), aiming to achieve a roadmap that is flexible in terms of CBM, apparel product, size, and location, yet, that still provides structured guidance towards the engagement of consumers in circular consumption systems.

Roadmap Development

The transition to a CE, especially in the apparel sector, undertakes GC concerning the current production and consumption patterns, reflecting on social, environmental, and economic changes. George et al. (2016) propose a framework, from an organizational perspective, that addresses grand challenges through three main steps: articulating and participating in GC, multilevel actions, and outcomes and impact.

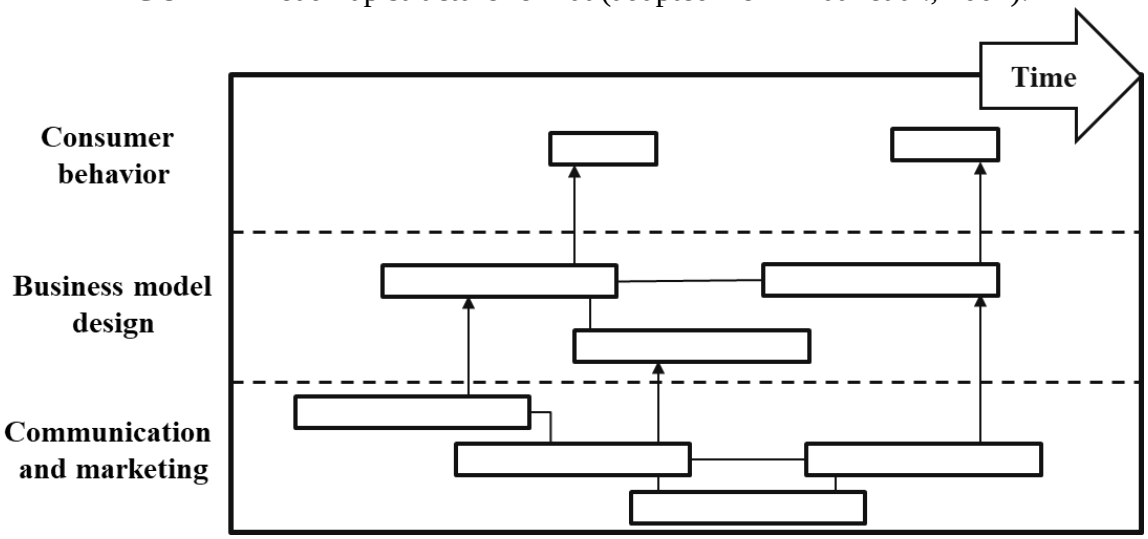
According to the authors, the first step to addressing grand challenges is to identify and vocalize the transition goals and inspire the participation of actors to reach them, providing a collective sense of purpose. This step is only possible by targeting societal barriers and identifying and addressing actors' needs. To move to the second step George et al. (2016) suggest that organizational constraints (e.g., transaction costs, stakeholder coordination, etc.) should be identified and managed and institutional context (e.g., societal norms, environmental regulations, etc.) mapped, allowing to achieve a multilevel action, that is, behaviors or actions from actors that influence many levels (individual, community, regional, etc.) that should be aligned synergically to achieve the proposed goals. Finally, to advance to the third step, reinforcing mechanisms should be used to motivate actors, and coordinating architectures made available to enable dialogue and

understanding from all stakeholders, achieving measurable outcomes and impacts, such as behavioral changes (George et al., 2016). The approach to our roadmap structure development takes into account this framework.

A roadmap is a tool used to plan innovation processes (Oliveira et al., 2019), such as addressing GC and engaging consumers in the CE. This tool is flexible, commonly used for long-range planning, and can have a multiorganizational target, that is, it captures the landscape, threats, and opportunities for a particular group of stakeholders in an application field (Phaal, Farrukh, & Probert, 2004). Roadmaps have been adapted to support many strategic aims, however, one of its main traits is to be a time-based structured framework, that is, they represent and communicate strategic plans in a temporal sequence (Phaal et al., 2004).

Roadmaps can have different purposes (e.g., product, capability, and integration planning, etc.) and representations (e.g., bars, tabular, graphical, etc.) (Phaal et al., 2004). Ours was designed as a strategic planning roadmap, that is, starting from a future vision for the organization, it guides the mapping of the current position and the identification of gaps, to then provide the tools to achieve the organization's future vision. Additionally, it is represented in a multiple layer format, allowing the tracking of the evolution within each layer together with the interlayer dependencies (Phaal et al., 2004). However, differently from the traditional 'technology, product and market' layers, our roadmap structure will be represented according to our main themes: consumer behavior, BM design and communication and marketing (Figure 1)

FIGURE 1 Roadmap structure format (adapted from Phaal et al., 2004).



According to these features previously described, we develop our roadmap structure based on the data collected from earlier stages of this PhD research (including desk research, systematic literature reviews, workshops, interviews, and a survey) and on the data collected from the interviews with Company A and Company B. Discrepancies were resolved through discussion.

RESULTS

During the first part of this section, we present the results from the interviews, focusing on the main insights from Company A and Company B. Following, we present our roadmap structure, including how it addresses grand challenges and its main features.

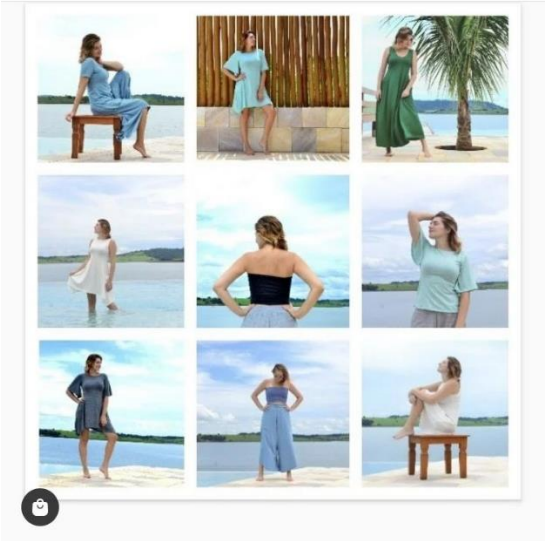
Interviews

Company A

The interview with Company A's founder and owner allowed a great deal of comprehension of our research theme from the perspective of a close relationship between the company and customers. The interviewee is responsible for the design of the company's BM, for drawing and assembling the pilot for all the company's clothing, for establishing communication and marketing strategies, and for most of the company's sales, resulting in an integrated view of the topics we are addressing in this paper.

Company A works with two CBM, circular inputs, by using polyester fabric from PET (polyethylene terephthalate) and organic cotton fabric, and life cycle extension, by designing timeless clothing and enhancing durability through careful material selection (Figure 2). The interviewee believes that their company's competitors are other sustainable brands, as its consumers usually seek this kind of product. However, these sustainable brands are also perceived as collaborators, that is, the brands that implement CBMs in the same city that Company A is located have different strength features, and, according to the interviewee, these brands were able to create a collaboration network, where they refer clients to one another without hindering their revenue. However, Company A is still struggling with end-of-life strategies, mainly because it would interfere with their collaborators'/competitors' position in the market, e.g., second-hand and upcycling shops.

FIGURE 2 Company A's products.



Source: Original post

The interviewee believes that the company's appeal to its consumers is the uniqueness of the apparel design. Although Company A's commitment to the CE is important to its customer, allowing, for instance, to charge higher prices (compared to linear apparel) due to the awareness of a just price (i.e., valuing the fabric quality, local workforce, and the complexity for assembling the pieces, etc.), the sustainability of the clothing is perceived as a not strong influence to alone incite consumption behaviors. For example, some colors and prints are only available in fabrics composed of a mixture of textiles, which have lower environmental performance compared to fabrics from organic cotton, however, the interviewee believes that their customers need to feel well in their clothes, including their identification with colors and prints, therefore, Company A offers 'less sustainable' items, which is communicated to the clients, who are, then, able to make the consumption decision aware of its consequences.

The interviewee also shared that some aspects of circularity are not perceived as important for their customers. Company A provides packaging hand made from fabric scraps (Figure 3), Although some clients value this initiative, keep their packaging and reuse it in subsequent purchases, other clients are annoyed by the lack of single-use and 'giftable' packaging.

FIGURE 3 Company A's packaging made from fabric scraps.

Source: Company A's founder.

Company A's clients, therefore, have two main profiles: the clients who are involved with sustainability and are interested in sharing information about clothing production and its social and environmental impacts; and the clients who are driven by design and comfort, that is, although they are aware of the company's sustainable efforts, they do not influence these consumers' decision to acquire the company's products. This knowledge of consumers' characteristics was reported as the result of the familiarity with customers, especially the loyal ones. However, they do not seem to deeply guide the design of the company's CBM nor the design of products, which is the outcome of the interviewee's values, especially biospheric ones.

Although all customers from Company A are aware of issues concerning sustainability and circularity, the interviewee reckons that the amount of people caring about these issues is growing. However, people are less inclined to hear and discuss these issues, at least through the communication channel established by the company, i.e., Instagram. During the interview, Company A's founder said the communication interventions focused on educating and raising awareness of consumers were frequent, but she believes the Covid-19 pandemic and the political instability in Brazil made people less open to these kinds of communications and marketing strategies, and the Instagram became a digital place to forget about the 'negative things in life'.

Company A, therefore, had a change in marketing and communication strategies. Raising awareness on important questions in the apparel industry, such as slavery and healthy work conditions, began to drive customers away. The company's current strategy focuses on opening

communication and stimulating critical thought and fact-based consumption decisions (Figure 4), by positioning the company as sustainable and promoting the benefits of consuming their products.

FIGURE 4 Company A's positioning on Instagram (4a, 4b and 4c from left to right)

Figure 4a – 'Waste is a design flaw. Manifest for a cradle-to-cradle circular economy' (translated from Portuguese to English). Source: Shared from Idea Circular (https://www.instagram.com/ideiacircular)

Figure 4b – 'Let's talk about sustainability?' (translated from Portuguese to English). Source: Original post

Figure 4c – 'Because we talk so much about organic cotton' (translated from Portuguese to English). Source: Original post

Company B

Differently from the insights from Company A, Company B provided the perspective of corporations and medium and large enterprises.

Company B's first leap toward the Circular Economy was in 2019, when the group acquired B1, a second-hand online platform, as an investment in circularity, perceived by the company as the future of fashion. B1 currently enables the circular flow for other Company B's brands, which now have collection points across their physical stores, giving products a subsequent life through commercialization in B1's platform, therefore, implementing a life-extension CBM. B2, on the other hand, employs two CBMs, the recovery of resources and the use of circular inputs. Circular inputs are also the CBM implemented by B3, which uses the life cycle analysis (LCA) technique to guide the choice of materials, resources and processes to offer its clients carbon neutral products. Figure 5 presents examples of circular offerings from B1, B2 and B3, respectively.

FIGURE 5 Company B's circular products (5a - B1, 5b - B2, and 5c - B3, from left to right).



Figure 5a - Source: Original post

Figure 5b – Source: Leandro Tumenas/Disclosure

Figure 5c - Source: Original post

According to the interviewee, the company's circular brands compete with products and services from 'linear' brands, despite the market efforts to create a segmentation for sustainable products. Company B's clients, regardless of brand or platform, are mostly driven by aesthetics and price. Although sustainability and circularity may be important and valued by some customers, these factors alone do not drive the acquisition of apparel. Moreover, the interviewee highlighted that the company has some difficulties implementing some CBM. For example, B1 operations suffer from consumers' barriers to acquiring second-hand items, such as lack of trust and myths concerning the items' previous owners, especially for luxury items which is B1's market niche.

Regarding the communication and marketing strategies, Company B focuses first on raising awareness of their consumers to then present their brands as sustainable and circular. The main channels the company uses are its social media, mainly Instagram, but also its physical stores. B3's Instagram profile, for instance, provides information to educate customers on themes sensitive to sustainability (e.g., consuming less meat, protecting forests, extending products' life cycle, etc.), and presents how the brands' products contribute to these themes (Figure 6). Moreover, B3's physical stores create an environment that elicits sustainability, enhancing consumers' visual and tactile experiences (Figure 7).

FIGURE 6 B3's positioning on Instagram.

Figure 6a – '3 attitudes to reduce your individual carbon footprint' (translated from Portuguese to English). Source: Original post

Figure 6b – 'B3 returns. Your footwear restarts here' (translated from Portuguese to English). Source: Original post

Figure 6c – 'Slide Ecoa, vegan and 100% recyclable. 1,6 kg carbon footprint: 44% from resources and production, 25% from transport, and 31% from packaging' (translated from Portuguese to English). Source: Original post

FIGURE 7 B3's physical store in São Paulo.

Source: Disclosure

Concerning the consumers' behavior, the interviewee emphasized that, like the majority of medium and large retail enterprises, Company B has a clear profile of the brands' consumers, in terms of

sociodemographic features, and the customers from B1, B2 and B3 are not significantly different from the other Company B's 'linear' brands. Furthermore, the company develops a persona (fictional characters created to represent a product's core customer features, helping the brand envision their needs and identify the factors that influence their behavior) for each new product or collection release. Although the development of this persona somehow addresses consumers' intrinsic factors, they are not mapped by the company.

Overall, the interviewee shared that the main challenges towards the engagement of consumers in Company B's circular brands are, on a landscape level, the lack of enabling levers, such as public policies and legislations that promote the CE in Brazil, and, on the consumer level, the lack of awareness and knowledge of the Brazilian population towards sustainability and circularity.

Roadmap structure

Our roadmap structure (Figure 8) gathers conceptual and practical insights to guide apparel companies to engage consumers in circular consumption systems.

The roadmap structure presents a configuration of activities (blocks) in the three domains (layers) of this research, consumer behavior, business model design, and communication and marketing. These activities are presented in a time-based order (from left to right). Moreover, these activities influence each other (represented by the arrows), by providing necessary inputs. Next, we present a description of each activity (Table 2).

Furthermore, the roadmap structure development was guided by George et al.'s (2016) framework for addressing grand challenges. Our roadmap structure gathered the main stakeholders of the apparel value chain to solve a common grand challenge, the environmental and social negative impacts of the apparel industry, by engaging consumers with apparel circular products/services. Additionally, these stakeholders are involved in the solution proposed, when considering consumers' features and when including the apparel value chain in designing CE offerings and communication and marketing approaches, resulting in a synergic framework. Finally, by sharing value among the company, its consumers, and the value chain stakeholders, our roadmap structure keeps all actors motivated, at the same time achieving lasting changes in circular consumption systems.

FIGURE 8 Roadmap structure for apparel consumer engagement in circular consumption systems.

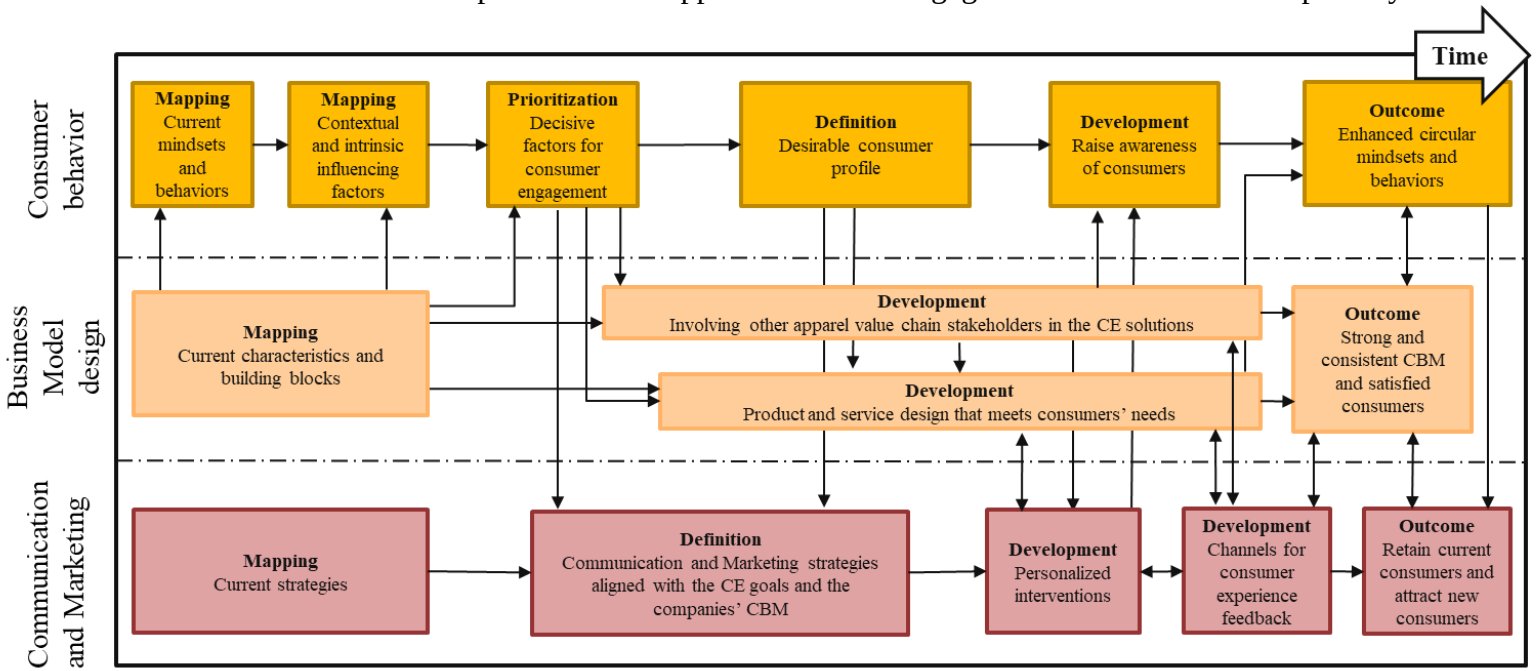


TABLE 2 Description of the roadmap structure activities

Type of activity	Layer	Activity	Description
Mapping	Consumer behavior	Current mindsets and behaviors	To identify the current mindsets and behaviors of consumers, including if they differ according to the company's product or CBMs.
		Contextual and intrinsic influencing factors	To identify which factors influence, positively and negatively, the engagement of current consumers. If possible, relate the factors to consumers' mindsets and behaviors.
	Business model design	Current characteristics and building blocks	To draw the current business model canvas, by identifying its characteristics and how they relate to consumer behavior and communication and marketing strategies.
	Communication and marketing	Current strategies	To identify the company's current communication and marketing strategies, including how they promote the company's CBM(s) and address the consumers' mindsets and behaviors.
Prioritization	Consumer behavior	Decisive factors for consumer engagement	To identify, according to consumers' mindsets and behaviors and the company's CBM, what are the main factors hindering and boosting engagement in circular consumption systems.
Definition	Consumer behavior	Desirable consumer profile	To choose what mindsets and behaviors to encourage, in accordance with current consumers' features and needs.
	Communication and marketing	Communication and marketing strategies aligned with the CE goals and the companies' CBM	To choose the company's main communication and marketing approaches, considering the behaviors the organization wants to encourage and the factors that influence consumer engagement.
Development	Consumer behavior	Raise awareness of consumers	To boost consumers' knowledge and awareness concerning circularity and sustainability, especially in the apparel industry's context, by approaching factors that influence their behavior.
	Business model design	Involving other apparel value chain stakeholders in the CE solutions	To collaborate with stakeholders in the apparel value chain to develop CE solutions and address consumers' needs and share value with them.
		Product and service design that meets consumers' needs	To design new products and services considering consumers' features, needs, and the mindsets and behaviors encouraged.

	Communication and marketing	Personalized interventions	To create communication and marketing strategies for each consumer profile identified, promoting customized experiences that boost the mindsets and behaviors the company is seeking to encourage.
		Channels for consumer experience feedback	To make available channels for consumer feedback, including their experiences in the use and post-use phases, improving the development of products/services and approaches to communication and marketing.
Outcome	Consumer behavior	Enhanced circular mindsets and behaviors	Consumers with responsive circular mindsets and behaviors, that endorse the CE principles and allow the flow of resources and products in circular consumption systems.
	Business model design	Strong and consistent CBM and satisfied consumers	Circular Business Model(s) that promotes CE solutions aware of consumers' features and attentive to how to address them.
	Communication and marketing	Retain current consumers and attract new consumers	Loyal consumers who feel valued by the company's efforts to meet their needs, and new consumers who are attracted to the company's offerings and how they are communicated.

DISCUSSION

The apparel sector is responsible for environmental pressures at the planetary level, through increasing demand for natural resources and pollution footprint, accelerated consumption, and material leakage across all stages of apparel's life cycle. These pressures are grand challenges faced by the industry and society, calling for systemic changes that involve companies, policymakers, consumers, suppliers, and other stakeholders.

Our evaluation of the Brazilian apparel scenario (Gomes et al., 2021) showed that companies are transitioning to the CE and implementing CBMs, still, they are niches in the Brazilian apparel industry, exemplified by the interviewees, Company A and initiatives B1, B2 and B3. These niches can gain scale and make the circular fashion the new sector regime, collaborating with diminishing the pressure on the environment. However, companies implementing CBMs face several barriers, including cultural inertia and lack of consumer awareness.

Brazilian consumers are, overall, interested in consuming circular apparel, however, this behavior can be perceived, by these consumers, as effortful, calling for interventions that increase their awareness and the activate their feelings of achieving positive environmental and societal outcomes by consuming circular apparel (Gomes et al., 2022b). Additionally, consumers' mindsets and behaviors were found to be fundamental to the flow of products and resources in circular consumption systems, along with the factors that influence, boost or hinder, their engagement with circular products and services (Gomes et al., 2022a).

This paper addresses the challenges of engaging consumers, specifically in the apparel industry, by promoting changes in BM design, especially concerning stakeholder involvement and product design, and by giving particular importance to consumer behavior and communication and marketing strategies. Our roadmap structure provides a path for apparel retail companies, of any size, to incorporate their consumers' contextual and intrinsic features in developing circular products and services, as well as establishing appropriate strategies to communicate and promote the company's sustainability and circularity efforts. We believe that this consistent and unified approach can result in willing and loyal circular consumers.

Changing behaviors and mindsets is a hard and slow task, yet, necessary for the success of the circular economy. Regardless, immediate actions ought to be carried out to engage consumers and start promoting circular products and services. Values, beliefs and norms

are key drivers of individuals' choices and behaviors, and our roadmap structure proposes that the companies understand these drivers and identify the factors that are extremely important to their consumers, adapting products and marketing strategies in accordance. For instance, consumers who show strong materialistic values and have a consumerism lifestyle probably won't engage with long-lasting products with the goal to reduce consumption; therefore, providing customers with products/services and communication and marketing strategies that support their values (e.g., platforms of shared apparel and promotion of the initiative as unique and luxurious, respectively) allow the circular flow of resources and products while still promoting changes in consumers' behaviors and mindsets.

Therefore, we believe that our roadmap structure, besides contributing to the long-lasting changes and raising awareness of consumers, also supports the success of circular initiatives in the early stages of the transition to a circular economy. Additionally, the roadmap structure can be employed as an iterative process, identifying new opportunities and making adjustments at each run, as an adaptative tool to the rapid changing apparel sector context.

Limitations and future research

Although this paper addresses the circular business model design, we focused on the feature that has a greater influence on consumer behavior, i.e., product development; however, we acknowledge that all CBMs' building blocks are indispensable for the CE transition and further research should address how these blocks can influence consumer engagement.

Furthermore, our previous research and interviews show the lack of macro-level incentives and enabling legislation concerning the circular economy implementation in Brazil, which can hold back the growth and continuance of circular apparel initiatives. The roadmap structure encourages the collaboration among stakeholders to develop circular solutions and, we envision that this enhances stakeholder alignment on other fronts, such as pressuring for public policies favorable to the circular economy transition. However, the roadmap structure does not address these systemic challenges, which should also be considered in further research.

At last, we suggest that this roadmap should be implemented by apparel companies and improvements inputted into the tool, including long-term perspectives for researchers and practitioners.

CONCLUSION

Apparel companies that implement circular business models face challenges concerning consumer engagement in these new streams of value, products, and resources. Our roadmap structure presents activities that gather, consistently, three essential concepts in shaping and promoting consumer engagement, consumer behavior, business model design, and communication and marketing approaches. The roadmap structure proposes that products and marketing efforts should be designed according to the behavior the companies wish to promote, as well as consumers' current mindsets, behaviors and influencing factors.

Furthermore, we identified that circular apparel companies, such as the interviewed ones, have similar approaches to consumer engagement, already combing the three layers proposed by our roadmap. However, they lack a structured tool to guide this process and to provide insights for new business opportunities, including iterative implementations to achieve a cycle of continuous improvement. Our roadmap structure aims to fulfil this gap. Therefore, we believe that the proposed tool can benefit the transition to a circular fashion, especially in Brazil, and contribute to the research of consumer behavior and engagement in the circular economy literature.

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6. Conclusion

Our focus on the apparel and fashion industry provided a rich application field for this research. This sector is hugely globalised, it has great cultural and economic importance, and it is responsible for a range of products and services, as well as a diversified value chain. However, the apparel and fashion industry's negative environmental and social impacts are as great as its contribution to society, mainly due to its linear approach to its production and consumption systems. The linear mindset is expressed in this sector through the undervaluation of important stakeholders, inefficient resource management, generation of expressive pollution footprint, and promotion of exacerbated consumption, among others. This linear pattern puts at risk the apparel and fashion industry's operations. We suggest that to tackle the sector's negative impacts, it should implement the circular economy.

The complexity of the transition to the circular economy has been addressed throughout all the stages of this PhD research. The CE addresses issues that are well known and still contemporary, proposing solutions that encompass innovative ways to perceive value and businesses, and their relationship with the environment and society. Therefore, the transition to the CE requires many changes, including business model innovation, technological development, enabling policies and legislations, societal behaviours, and, of course, consumer engagement.

The CE is not implemented alone and mapping the Brazilian apparel value chain and its stakeholder was an essential step for the development of this research. We found that the Brazilian apparel sector's strength relies on the country's macro-economy relevance, a large and diverse internal market, the appreciation of its cultural identities (Brazilianity of designs and prints) and the exportation of raw materials. Moreover, Brazil combines a diverse range of apparel products and services, illustrating the importance of the textile service sector and the efficiency of micro and small enterprises, such as assembly and retails. Furthermore, we identified the opportunities and barriers concerning the transition for the CE faced by many of the apparel industry stakeholders and recommend that: niche initiatives should be encouraged with the help of policy strategies, stakeholders should communicate and collaborate to develop and deliver CE solutions, cultural changes should be leveraged, and organisational competencies should be developed.

The lack of consumer engagement and the development of circular mindsets among apparel users were pointed out during our background research with the Brazilian apparel sector as a barrier and window of opportunity for the transition to a CE, respectively. These inputs guided the following developments of this research.

Therefore, we focused on the interaction between companies and consumers and how engagement towards circular apparel offerings could be promoted. The environmental psychology field provides theories and models that guide the understanding of individual pro-environmental behaviour, such as the adoption of circular apparel. Three of these theories (Theory of Planned Behaviour (TPB); Norm-Activation Model (NAM); Value-Belief-Norm (VBN) theory) lead to the continuation of this research with the development of a questionnaire that gathered information on consumers' psychological and contextual factors. This questionnaire was presented to the CE scientific community and the research relevance was confirmed.

However, during the questionnaire's development, we found that the CE literature lacked research that combined the factors that boost or hinder the flow of resources and products in circular consumption systems. We carried out a systematic literature review and identified six circular mindsets, 15 circular behaviours, and 54 influencing factors. Furthermore, we positioned these elements in the consumption system, stating that circular consumption systems rely on consumers' circular mindsets, which are expressed by circular behaviours, and which, in turn, are influenced by sets of intrinsic and extrinsic factors.

After this literature review and preliminary correlation analysis of the data collected among Brazilian and Dutch apparel consumers, we decided to carry out our data analysis using the VBN theory, testing values, beliefs (awareness of consequences and outcome efficacy) and (personal) norms. The survey was important to gather insights from actual apparel consumers, especially from the Brazilian context, and to identify differences from a country that is more mature in its CE implementation, the Netherlands. Our results support that the value-belief-norm path can explain circular consumption behaviour, supporting hypotheses 2 and 3. However, we did not find that materialistic values are important predictors of consumer behaviour towards circular apparel, rejecting hypothesis 1. Furthermore, the results suggest that apparel retail companies should target consumers' behaviour and their influencing factors when designing their business strategies and communication campaigns.

Thusly, we proposed a structure to a roadmap to guide apparel retail companies in engaging their consumers in circular consumption systems, by approaching consumer behaviour, business model design, and communication and marketing strategies in a set of continuous and iterative activities. This research, therefore, contributes to the field of consumer behaviour in the circular economy and presents a framework and a tool that can be used by apparel companies in their implementation of CE business models and principles.

Consequently, this PhD research answers its research question by proposing that consumer engagement in the circular consumption systems can be facilitated by apparel retail companies by mapping and understanding the features of consumers' mindsets and behaviours and employing the factors that influence them in the design of the companies business models, as well as in the promotion of communication strategies that raise consumers' awareness.

Moreover, to reach this research's overall goal, five specific objectives were suggested, along with 13 deliverables. These specific goals and deliverables were gathered into five articles, which reveal this research's commitment to caring out a methodical approach to these complex and intertwined concepts, as well as its originality and contribution to the circular economy literature and application fields.

However, this research presents some limitations, such as its application in the Brazilian apparel industry. Even though some of this research's implications on consumer behaviour towards the circular economy should be valid for other industrial sectors and countries, it needs further investigation. Additionally, the roadmap structure could not be applied during this research's development, therefore, we indicate that, for future research, the roadmap structure should be employed in apparel retail companies from diverse backgrounds and various circular business model approaches, so its structure can be improved, and its application enhanced.

Furthermore, the TPB and NAM models should also be further investigated, as well as the influence of the factors identified in the SLR, in the circular apparel field. We also highlight those implications of Covid-19 on consumer circular behaviour, like consumers' willingness to share products, were not mapped by this research and should be investigated by further research.

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Appendices

Appendices 1 – Survey in English

Section 1 - Introduction

This study aims at gathering information on apparel consumers' beliefs and values. The study will last approximately 20 minutes. Participation in this research is completely voluntary. You can withdraw from your participation at any point.

Confidentiality: Your data will be treated strictly confidentially and will be analysed by the research team. Fully anonymised research data may be shared with other researchers for scientific purposes. Only summarized data will be published, for example in scientific journals. No information that could possibly identify you as a person will be collected in this study.

By proceeding to the next section, you agree that you have read the text properly and that you agree to participate in this study.

If you have any questions, please feel free to contact me:

Giovana Monteiro Gomes
University of São Paulo
giovana.gomes@usp.br

Section 2 – Values

The following questions will address your personal values.
Note that are no right or wrong answers, select the first option that comes to your mind.

2.1. Please rate how important the following values are for you as a guiding principle in your life.

You can answer on a scale from -1 to 7:
(-1) means the value is opposed to the principles that guide you
(0) means the value is not important at all; it is not relevant as a guiding principle in your life
(6) means the value is extremely important
(7) means the value is of supreme importance as a guiding principle in your life; usually there are no more than two such values per person

Your scores can vary of -1 up to 7. The higher the number (-1, 0, 1, 2, 3, 4, 5, 6, 7), the more important the value is as a guiding principle in your life. Try to distinguish as much as possible between the values by using all the numbers.

	Opposed to my values	Not important at all	Important					Extremely important	Of supreme importance
Equality: equal opportunity for all	-1	0	1	2	3	4	5	6	7
Respecting the earth: harmony with other species	-1	0	1	2	3	4	5	6	7
Social power: control over others, dominance	-1	0	1	2	3	4	5	6	7
Pleasure: joy, gratification of desires	-1	0	1	2	3	4	5	6	7
Unity with nature: fitting into nature	-1	0	1	2	3	4	5	6	7
A world at peace: free of war and conflict	-1	0	1	2	3	4	5	6	7
Wealth: material possessions, money	-1	0	1	2	3	4	5	6	7
Authority: the right to lead or command	-1	0	1	2	3	4	5	6	7
Social justice: correcting injustice, care for the weak	-1	0	1	2	3	4	5	6	7
Enjoying life: enjoying food, sex, leisure, etc.	-1	0	1	2	3	4	5	6	7
Protecting the environment: preserving nature	-1	0	1	2	3	4	5	6	7
Influential: having an impact on people and events	-1	0	1	2	3	4	5	6	7
Helpful: working for the welfare of others	-1	0	1	2	3	4	5	6	7
Preventing pollution: protecting natural resources	-1	0	1	2	3	4	5	6	7
Self-indulgent: doing pleasant things	-1	0	1	2	3	4	5	6	7
Ambitious: hard-working, aspiring	-1	0	1	2	3	4	5	6	7

2.2. Please read the statements below carefully and indicate to what extent you agree or disagree with them on a scale from 1 (strongly disagree) to 5 (strongly agree).

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I admire people who own expensive homes, cars, and clothes	1	2	3	4	5
The things I own say a lot about how well I'm doing in life	1	2	3	4	5
I like to own things that impress people	1	2	3	4	5
I try to keep my life simple, as far as possessions are concerned	1	2	3	4	5
I enjoy spending money on things that aren't practical	1	2	3	4	5
I like a lot of luxury in my life	1	2	3	4	5
My life would be better if I owned certain things I don't have	1	2	3	4	5
I'd be happier if I could afford to buy more things	1	2	3	4	5
It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like	1	2	3	4	5

Section 3 – Consumption Patterns

The following questions concern your consumption patterns regarding clothing.

3.1. How regularly do you buy one or more pieces of garment (clothes, footwear, accessories)?

- ❑ At least once a week
- ❑ Every two weeks
- ❑ Once a month
- ❑ Every 3 months
- ❑ Every 6 months
- ❑ Once a year

3.2. Where do you prefer to buy clothes and footwear?

- ❑ Physical stores on the street
- ❑ Physical stores on shopping centres
- ❑ Online
- ❑ Other: _____

3.3. How many pieces of garment (clothes, footwear, accessories) do you buy per year? If you are not sure, please give your best estimate. _____

3.4. For how long do you usually wear your trousers before disposing them (donate, discard, recycle, etc.)? Please, give your answers in months (e.g.: 12 months).
If you are not sure, please give your best estimate.
_____

3.5. For how long do you usually wear your shirts, tops and t-shirts before disposing them (donate, discard, recycle, etc.)? Please, give your answers in months (e.g.: 12 months).
If you are not sure, please give your best estimate.
_____

3.6. For how long do you usually wear your coats and sweaters before disposing them (donate, discard, recycle, etc.)? Please, give your answers in months (e.g.: 12 months).
If you are not sure, please give your best estimate.
_____

3.7. For how long do you usually wear your footwear (trainers, boots, etc.) before disposing them (donate, discard, recycle, etc.)? Please, give your answers in months (e.g.: 12 months).
If you are not sure, please give your best estimate.
_____

3.8. Please, indicate how often do you dispose your clothes and footwear by…

	Never	Rarely	Occasionally	Frequently	Always
Discarding them with the residual waste	1	2	3	4	5
Donating them	1	2	3	4	5
Delivering them at a recycling station	1	2	3	4	5

3.9. Please, indicate how important the aspects below are for you in the acquisition of a garment (clothes, footwear, accessories):
Please answer on a scale from 1 (meaning that you find it not important at all) to 5 (meaning that you find it extremely important).

	Not Important at all	Slightly Important	Moderately Important	Very Important	Extremely Important
Brand	1	2	3	4	5
Comfort	1	2	3	4	5
Design/Fashion	1	2	3	4	5
Durability	1	2	3	4	5

Price	1	2	3	4	5
Sustainability	1	2	3	4	5

Section 4 - Consumer understanding

The following questions will address your beliefs.
Note that are no right or wrong answers, select the first option that comes to your mind.

4.1. Please read the statements below carefully and indicate on a scale from 1 (strongly disagree) to 5 (strongly agree) to what extent you agree with the statements.

Fast-fashion, in this context, can be understood as cheap, trendy clothing, that samples ideas from the catwalk or celebrity culture and turns them into garments in high street stores at rapid speed.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The production and consumption of fast-fashion causes important problems for society	1	2	3	4	5
The production and consumption of fast-fashion cause serious environmental issues	1	2	3	4	5
I worry about the social and environmental impacts caused by the clothing/fashion industry	1	2	3	4	5
If I would reduce my consumption of fast fashion I would contribute to reducing social and environmental problems caused by fast fashion.	1	2	3	4	5

4.2. Please indicate to what extent the following statements are true **for you personally.**

I feel…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
...morally obligated to prevent social and environmental harm caused by the textile industry	1	2	3	4	5
...morally compelled to act to prevent social and environmental harm caused by the textile industry	1	2	3	4	5
…not obliged to do something to stop social and environmental harm in the textile industry	1	2	3	4	5

4.3. Please indicate to what extent the following statements are true **for society collectively.**

We are…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
...morally obligated to prevent social and environmental harm caused by the textile industry	1	2	3	4	5
...morally compelled to act to prevent social and environmental harm caused by the textile industry	1	2	3	4	5
…not obliged to do something to stop social and environmental harm in the textile industry	1	2	3	4	5

4.4. Please, rate the extent to which each of the following statements is true **for you personally.**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am the type of person who act environmentally-friendly	1	2	3	4	5
Acting environmentally-friendly is an important part of who I am	1	2	3	4	5
I see myself as a pro-environmental person	1	2	3	4	5

Section 5 - Circular Fashion

This section will gather data on the consumer perception of circular fashion products and services.

The Circular Economy looks beyond the current take-make-waste industrial model. It focuses on positive society-wide interest. It is, also, an innovative way to capture value, from the industry point of view, by reusing raw materials, designing waste out of the production, and leveraging automation, and distribute value, from the consumer perspective, as the services and products offered are more efficient, can be shared, and have their utilisation maximised. Therefore, the Circular Economy is beneficial for both businesses and users.
There are several business models that can be implemented by the Circular Economy. This research will focus only on product life cycle extension and reuse, that can be addressed in four ways:

- Product life-extension - New products are designed to be durable for a long lifetime (durability).

E.g.: Sneakers that are designed to last several years and can be easily repaired when needed.

- Facilitated reuse - Reuse with or without repair/upgrade and supplied either free of charge (FOC) or resold.
  E.g.: Jackets that can be repaired by the manufacturer and returned to the client, or resold later on.

- Product modular design - Products designed to be modular so that parts can be replaced to update/upgrade a product, but not replace the whole item.
  E.g.: Modular coats that can be re-designed by the consumer depending on the weather, adding or removing layers.

- Refurbish, repair, remanufacture and recondition - Product gets a next life (e.g. after remanufacture - the process of restoring the product or part functionality to "as-new" quality; facilitated by design for disassembly). Enables the producer to put the product back into the market to earn a second or subsequent income, from a second or subsequent user.
  E.g.: Blankets made of used t-shirts (or other products).

5.1. Please indicate to what extent you agree or disagree with the following statements on a scale from 1 (strongly disagree) to 5 (strongly agree).

I am willing to…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
… acquire less pieces of garments (clothes and footwear) if they have a longer life cycle	1	2	3	4	5
… pay a higher price if garments (clothes and footwear) have a longer life cycle	1	2	3	4	5
… reuse my clothes and footwear if they are upgradable	1	2	3	4	5
… use second-hand garment	1	2	3	4	5
… try clothes and footwear with a modular design	1	2	3	4	5
… acquire a new apparel that was refurbished/repaired/ remanufactured/ reconditioned	1	2	3	4	5
… recycle my clothes and footwear	1	2	3	4	5

5.2. Please, rate to the extent to which each of the following statements is true **for you personally.**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I feel morally obligated to consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I feel morally obligated to upcycle and reuse my clothes and footwear	1	2	3	4	5
I feel morally obligated to repair and extend the usability of my clothes and footwear	1	2	3	4	5
I would feel guilty if I did not consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I would feel guilty if I did not upcycle and reuse my clothes and footwear	1	2	3	4	5
I would feel guilty if I did not repair and extend the usability of my clothes and footwear	1	2	3	4	5
I would feel proud if I would consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I would feel proud if I would upcycle and reuse my clothes and footwear	1	2	3	4	5
I would feel proud if I would repair and extend the usability of my clothes and footwear	1	2	3	4	5

5.3. To what extent do you think a **typical citizen from the same country as you** would agree with the statements below.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I feel morally obligated to consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I feel morally obligated to upcycle and reuse my clothes and footwear	1	2	3	4	5
I feel morally obligated to repair and extend the usability of my clothes and footwear	1	2	3	4	5

I would feel guilty if I did not consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I would feel guilty if I did not upcycle and reuse my clothes and footwear	1	2	3	4	5
I would feel guilty if I did not repair and extend the usability of my clothes and footwear	1	2	3	4	5
I would feel proud if I would consume clothes and footwear that have a longer life cycle	1	2	3	4	5
I would feel proud if I would upcycle and reuse my clothes and footwear	1	2	3	4	5
I would feel proud if I would repair and extend the usability of my clothes and footwear	1	2	3	4	5

5.4. Please indicate if you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I think that to consume clothes and footwear that have a longer life cycle is effective to reduce social and environmental harm in the textile industry	1	2	3	4	5
I think I can contribute to reducing social and environmental problems by consuming clothes and footwear that have a longer life cycle	1	2	3	4	5
I think that to upcycle and reuse my clothes and footwear is effective to reduce social and environmental harm in the textile industry	1	2	3	4	5
I think I can contribute to reducing social and environmental problems by upcycling and reusing my clothes and footwear	1	2	3	4	5
I think that to repair and extend the usability of my clothes and footwear is effective to reduce social and environmental harm in the textile industry	1	2	3	4	5
I think I can contribute to reducing social and environmental problems by repairing and extending the usability of my clothes	1	2	3	4	5

5.5. Please consider the four business models described above.
Product life-extension - New products are designed to be durable for a long lifetime.
Facilitated reuse - Reuse with or without repair/upgrade.
Product modular design - Parts of products can be replaced to be updated/upgraded without replacing the whole item.

Refurbish, repair, remanufacture and recondition - Product gets a next life and the producer can put the product back into the market to earn a second or subsequent income, from a second or subsequent user.

Please indicate to what extent you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Clothes and footwear with longer life cycles are easily available	1	2	3	4	5
Clothes and footwear with longer life cycles are more expensive than regular clothes and footwear	1	2	3	4	5
Clothes and footwear with longer life cycles are less fashionable than regular clothes and footwear	1	2	3	4	5
Consuming clothes and footwear with longer life cycles is up to me	1	2	3	4	5
Clothes and footwear with longer life cycle match my life-style	1	2	3	4	5
Reusable and upgradable clothes and footwear are easily available	1	2	3	4	5
Reusable and upgradable clothes and footwear are more expensive than regular clothes and footwear	1	2	3	4	5
Reusable and upgradable clothes and footwear are less fashionable than regular clothes and footwear	1	2	3	4	5
Consuming reusable and upgradable clothes and footwear is up to me	1	2	3	4	5
Reusable and upgradable clothes and footwear match my life-style	1	2	3	4	5
Modular and upgradable clothes and footwear are easily available	1	2	3	4	5
Modular and upgradable clothes and footwear are more expensive than regular clothes and footwear	1	2	3	4	5
Modular and upgradable clothes and footwear are less fashionable than regular clothes and footwear	1	2	3	4	5
Consuming modular and upgradable clothes and footwear is up to me	1	2	3	4	5
Modular and upgradable clothes and footwear match my life-style	1	2	3	4	5
Repaired, remanufactured and reconditioned clothes and footwear are easily available	1	2	3	4	5
Repaired, remanufactured and reconditioned clothes and footwear are more expensive than regular clothes and footwear	1	2	3	4	5

Repaired, remanufactured and reconditioned clothes and footwear are less fashionable than regular clothes and footwear	1	2	3	4	5
Consuming repaired, remanufactured and reconditioned clothes and footwear is up to me	1	2	3	4	5
Repaired, remanufactured and reconditioned clothes and footwear match my life-style	1	2	3	4	5

5.6. Please, read the statements below and indicate if you agree or disagree with them.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am willing to pay more for a garment that is more durable	1	2	3	4	5
I am willing to pay more for a garment that can be upgradable	1	2	3	4	5
I am willing to pay more for a remanufactured garment	1	2	3	4	5
Garments that last longer may save money over time	1	2	3	4	5
A majority of people use garments that last longer and are easier to repair	1	2	3	4	5
Ethical and sustainable garments are expensive	1	2	3	4	5

Section 6 – Demographics

The following questions concern some demographic information.

6.1. What is your gender:

- ❏ Female
- ❏ Male
- ❏ Transgender
- ❏ Other: _____
- ❏ I prefer not to say

6.2. What is your age? (E.g.: 25) _____

6.3. What is your nationality? (E.g.: Dutch) _____

6.4. What is your average household income? If you are not sure, please give your best estimate.

- ❑ Less than €1.000 net per month
- ❑ €1.000-1.999 net per month
- ❑ €2.000-2.999 net per month
- ❑ €3.000-3.999 net per month
- ❑ €4.000-4.999 net per month
- ❑ €5.000 net per month or more
- ❑ I prefer not to say.

Appendices 2 – Survey in Portuguese

Seção 1 – Introdução

Este trabalho tem como objetivo reunir informações sobre crenças e valores dos consumidores de vestuário. O questionário dura aproximadamente 20 minutos. A participação nessa pesquisa é completamente voluntária. Você pode excluir sua participação a qualquer momento.

Confidencialidade: seus dados serão tratados confidencialmente e analisados pelo grupo de pesquisa. Informações anônimas poderão ser compartilhadas com outros pesquisadores com propósitos científicos. Apenas dados resumidos serão publicados, em revistas científicas por exemplo. Nenhuma informação que possa identificar você como indivíduo será coletada nessa pesquisa.

Seguindo para a próxima seção você concorda que leu o texto com atenção e que concorda em participar do estudo.

Se você tiver quaisquer dúvidas não hesite em entrar em contato:

Giovana Monteiro Gomes
Universidade de São Paulo
giovana.gomes@usp.br

Seção 2 – Valores

As questões a seguir irão tratar sobre seus valores pessoais.
Note que não existem respostas certas ou erradas, selecione a primeira opção que vier a sua mente.

2.1. Relacione o quão importante os seguintes valores são para você como princípios norteadores da sua vida.

Você pode responder em uma escala de -1 a 7:
(-1) significa que o valor é oposto aos seus princípios norteadores
(0) significa que o valor não é importante e não é relevante como um princípio norteador da sua vida.
(6) significa que o valor é muito importante
(7) significa que o valor é de extrema importância como um princípio norteador na sua vida; geralmente não existem mais que dois valores deste por pessoa

Sua nota pode variar de -1 a 7. O quão mais alto o número é, mais importante o valor é como um princípio norteador na sua vida. Tente distinguir o máximo possível entre os valores utilizando todos os números.

	Oposto aos meus valores	Nem um pouco importante	Importante					Muito Importante	De extrema importância
Igualdade: oportunidades iguais para todos	-1	0	1	2	3	4	5	6	7
Respeitando a Terra: harmonia com outras espécies	-1	0	1	2	3	4	5	6	7
Poder social: controle sobre outros, dominância	-1	0	1	2	3	4	5	6	7
Prazer: alegria, gratificação e desejo	-1	0	1	2	3	4	5	6	7
União com a natureza: integração na natureza	-1	0	1	2	3	4	5	6	7
Um mundo em paz: livre de guerras e conflitos	-1	0	1	2	3	4	5	6	7
Riqueza: posse material, dinheiro	-1	0	1	2	3	4	5	6	7
Autoridade: direito de liderar ou comandar	-1	0	1	2	3	4	5	6	7
Justiça social: corrigir injustiça, cuidado com o vulnerável	-1	0	1	2	3	4	5	6	7
Aproveitando a vida: aproveitando comida, sexo, lazer, etc.	-1	0	1	2	3	4	5	6	7
Protegendo o meio ambiente: preservando a natureza	-1	0	1	2	3	4	5	6	7
Influência: ter um impacto em pessoas e eventos	-1	0	1	2	3	4	5	6	7
Gentileza: trabalhar para o bem estar do próximo	-1	0	1	2	3	4	5	6	7
Prevenindo poluição: protegendo recursos naturais	-1	0	1	2	3	4	5	6	7
Autoindulgente: fazendo coisas prazerosas	-1	0	1	2	3	4	5	6	7
Ambição: trabalhador, aspirante	-1	0	1	2	3	4	5	6	7

2.2. Leia cuidadosamente as afirmações abaixo e indique o quanto você concorda ou discorda delas utilizando uma escala entre 1 (discordo totalmente) e 5 (concordo totalmente).

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu admiro pessoas que possuem casas, carros e roupas caras	1	2	3	4	5
As coisas que eu possuo dizem muito sobre o quão bem estou de vida	1	2	3	4	5
Eu gosto de possuir coisas que impressionam pessoas	1	2	3	4	5
Eu tento manter minha vida simples no que diz respeito às posses	1	2	3	4	5
Eu gosto de gastar dinheiro com coisas que não são práticas	1	2	3	4	5
Eu gosto muito de luxo na minha vida	1	2	3	4	5
Minha vida seria melhor se eu possuísse algumas coisas que eu não tenho	1	2	3	4	5
Eu seria mais feliz se eu pudesse comprar mais coisas	1	2	3	4	5
As vezes me incomoda bastante o fato de que eu não posso comprar todas as coisas que eu gostaria	1	2	3	4	5

Seção 3 – Padrões de Consumo

As questões a seguir consideram os seus padrões de consumo referentes a vestuário.

3.1. Com que frequência você compra uma ou mais peças de vestuário (roupas, calçados, acessórios)?

- ❑ Pelo menos uma vez por semana
- ❑ A cada duas semanas
- ❑ Uma vez por mês
- ❑ A cada 3 meses
- ❑ A cada 6 meses
- ❑ Uma vez por ano

3.2. Onde você prefere comprar suas roupas e calçados?

- ❑ Lojas físicas na rua
- ❑ Lojas físicas em shoppings
- ❑ Online
- ❑ Outro: _____

3.3. Quantas peças de vestuário (roupas, calçados, acessórios) você compra por ano? Se você não tiver certeza, por favor dê sua melhor estimativa.

_____

3.4. Por quanto tempo você geralmente veste suas calças antes de se desfazer delas (doação, descarte, reciclagem, etc.)? Por favor, responda em meses (ex.: 12 meses).
Se você não tiver certeza, por favor dê sua melhor estimativa.

_____

3.5. Por quanto tempo você geralmente veste suas camisas, tops e camisetas antes de se desfazer delas (doação, descarte, reciclagem, etc.)? Por favor, responda em meses (ex.: 12 meses).
Se você não tiver certeza, por favor dê sua melhor estimativa.

_____

3.6. Por quanto tempo você geralmente veste seus casacos e suéteres antes de se desfazer deles (doação, descarte, reciclagem, etc.)? Por favor, responda em meses (ex.: 12 meses).
Se você não tiver certeza, por favor dê sua melhor estimativa.

_____

3.7. Por quanto tempo você geralmente usa seus calçados (tênis, botas, etc.) antes de se desfazer deles (doação, descarte, reciclagem, etc.)? Por favor, responda em meses (ex.: 12 meses).
Se você não tiver certeza, por favor dê sua melhor estimativa.

_____

3.8. Indique com que frequência você se desfaz das suas roupas e calçados através de...

	Nunca	Raramente	Ocasionalmente	Frequentemente	Sempre
Descarte no lixo comum.	1	2	3	4	5
Doação.	1	2	3	4	5
Entrega em um ponto de reciclagem.	1	2	3	4	5

3.9. Indique a importância para você dos aspectos abaixo na aquisição de peças de vestuário (roupas, calçados, acessórios):
Responda em uma escala de 1 (significa que você não acha o aspecto importante) a 5 (significa que você acha o aspecto extremamente importante).

	Nada Importante	Levemente Importante	Moderadamente Importante	Muito Importante	Extremamente Importante
Marca	1	2	3	4	5
Conforto	1	2	3	4	5
Design/Moda	1	2	3	4	5

Durabilidade	1	2	3	4	5
Preço	1	2	3	4	5
Sustentabilidade	1	2	3	4	5

Seção 4 - Compreensão do consumidor

As questões a seguir irão tratar sobre as suas crenças.
Note que não existem respostas certas ou erradas, selecione a primeira opção que vier a sua mente.

4.1. Leia cuidadosamente as afirmações abaixo e indique, usando uma escala entre 1 (discordo totalmente) e 5 (concordo totalmente), o quanto você concorda com elas.

Fast-fashion, neste contexto, pode ser entendida como roupas baratas e na moda, que mostram ideias de passarelas ou de cultura das celebridades, transformando-as em vestuário em lojas de rua em velocidade rápida.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
A produção e consumo de fast-fashion causa problemas importantes para a sociedade.	1	2	3	4	5
A produção e consumo de fast-fashion causa sérios impactos ambientais.	1	2	3	4	5
Eu me preocupo com os impactos sociais e ambientais causados pela indústria de vestuário.	1	2	3	4	5
Se eu reduzir o meu consumo de fast-fashion eu iria contribuir com a redução de problemas sociais e ambientais causados pela fast fashion.	1	2	3	4	5

4.2. Indique o quanto as seguintes afirmações são verdadeiras **para você pessoalmente**.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu me sinto moralmente obrigado(a) a prevenir danos sociais e ambientais causados pela indústria têxtil.	1	2	3	4	5
Eu me sinto moralmente obrigado(a) a agir para prevenir danos sociais e ambientais causados pela indústria têxtil.	1	2	3	4	5

Eu não me sinto obrigado(a) a fazer algo para evitar danos sociais e ambientais na indústria têxtil.	1	2	3	4	5

4.3. Indique o quanto as seguintes afirmações são verdadeiras **para a sociedade coletivamente**.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Nós somos moralmente obrigados a prevenir danos sociais e ambientais causados pela indústria têxtil.	1	2	3	4	5
Nós somos moralmente obrigados a agir para prevenir danos sociais e ambientais causados pela indústria têxtil.	1	2	3	4	5
Nós não somos obrigados a fazer algo para evitar danos sociais e ambientais na indústria têxtil.	1	2	3	4	5

4.4. Indique o quanto as seguintes afirmações são verdadeiras **para você pessoalmente.**

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu sou o tipo de pessoa que age de forma ambientalmente amigável.	1	2	3	4	5
Agir de forma ambientalmente amigável é uma parte importante de quem eu sou.	1	2	3	4	5
Eu me vejo como uma pessoa pro meio ambiente.	1	2	3	4	5

Seção 5 – Economia Circular

Esta seção irá reunir informações sobre a percepção do consumidor sobre produtos e serviços circulares.

A Economia Circular olha além do atual modelo industrial extrair-produzir-descartar. Ela está centrada em interesses positivos de toda sociedade. É, também, uma forma inovadora de capturar valor, do ponto de vista industrial, reutilizando matérias primas, projetando processos produtivos com menos desperdício, alavancando automação. Além disso, também foca na distribuição do valor, do ponto de vista do consumidor, a partir da oferta de produtos e serviços mais eficientes, que podem ser compartilhados e terem sua utilização maximizada. Portanto, a Economia Circular é beneficial tanto para empresas quanto para usuários.

Existem diversos modelos de negócio que podem ser implementados pela Economia Circular. Esta pesquisa irá focar apenas na extensão da vida útil do produto e reuso, que pode ser abordado de quatro maneiras:

- Extensão da vida útil do produto – Novos produtos são projetados para durarem uma longa vida útil (durabilidade)
  Ex.: Tênis que são planejados para durar muitos anos e podem ser facilmente reparados quando necessário.

- Reuso facilitado – Reuso com ou sem reparo/modernização e disponíveis sem custo ou revendidos.
  Ex.: Jaquetas que podem ser reparadas pelo produtor e retornam ao cliente ou são revendidas posteriormente.

- Design modular de produto – Produtos projetados para serem modulares a fim de que suas partes possam ser substituídas para atualizar/modernizar o produto, mas sem substituir todo o item.
  Ex.: Agasalhos modulares que podem ser redesenhados pelo consumidor dependendo do clima, adicionando ou removendo camadas.

- Renovar, reparar, remanufaturar e recondicionar – Produto ganha uma nova vida (ex.: remanufatura – o processo de restaurar a funcionalidade do produto ou partes dele para garantir uma qualidade 'como novo', facilitado pelo design para desmontagem). Permite o produtor colocar o produto de volta no mercado para ganhar uma segunda ou subsequente renda, de um segundo ou subsequente usuário.
  Ex.: Cobertores feitos de camisetas usadas (ou outros produtos).

5.1. Indique o quanto você concorda ou discorda com as afirmações a seguir utilizando uma escala entre 1 (discordo totalmente) e 5 (concordo totalmente).

Eu estou disposto(a) a...

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
… adquirir menos peças de vestuário (roupas e calçados) se elas tiverem um ciclo de vida útil mais longo	1	2	3	4	5
… pagar um preço mais alto se os vestuários (roupas e calçados) tiverem um ciclo de vida útil mais longo	1	2	3	4	5
… reutilizar minhas roupas e calçados se eles forem modernizáveis	1	2	3	4	5
… usar peças de vestuário de segunda mão	1	2	3	4	5
… experimentar roupas e calçados com design modular	1	2	3	4	5

… adquirir novas roupas que tenham sido remodeladas /consertadas/ remanufaturadas /recondicionadas	1	2	3	4	5
... reciclar minhas roupas e calçados	1	2	3	4	5

5.2. Indique o quanto as seguintes afirmações são verdadeiras **para você pessoalmente.**

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu me sinto moralmente obrigado(a) a consumir roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu me sinto moralmente obrigado(a) a reutilizar minhas roupas e calçados	1	2	3	4	5
Eu me sinto moralmente obrigado(a) a reparar e prolongar o uso das minhas roupas e calçados	1	2	3	4	5
Eu me sentiria culpado(a) se eu não consumisse roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu me sentiria culpado(a) se eu não reutilizasse minhas roupas e calçados	1	2	3	4	5
Eu me sentiria culpado(a) se eu não reparasse e prolongasse o uso das minhas roupas e calçados	1	2	3	4	5
Eu me sentiria orgulhoso(a) se eu consumisse roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu me sentiria orgulhoso(a) se eu reutilizasse minhas roupas e calçados	1	2	3	4	5
Eu me sentiria orgulhoso(a) se eu reparasse e prolongasse o uso das minhas roupas e calçados	1	2	3	4	5

5.3. O quanto você acha que um **cidadão comum do mesmo país que você** concordaria ou discordaria das afirmações abaixo.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu me sinto moralmente obrigado a consumir roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5

Eu me sinto moralmente obrigado a reutilizar minhas roupas e calçados	1	2	3	4	5
Eu me sinto moralmente obrigado a reparar e prolongar o uso das minhas roupas e calçados	1	2	3	4	5
Eu me sentiria culpado se eu não consumisse roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu me sentiria culpado se eu não reutilizasse minhas roupas e calçados	1	2	3	4	5
Eu me sentiria culpado se eu não reparasse e prolongasse o uso das minhas roupas e calçados	1	2	3	4	5
Eu me sentiria orgulhoso se eu consumisse roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu me sentiria orgulhoso se eu reutilizasse minhas roupas e calçados	1	2	3	4	5
Eu me sentiria orgulhoso se eu reparasse e prolongasse o uso das minhas roupas e calçados	1	2	3	4	5

5.4. Indique se você concorda ou discorda das afirmações a seguir.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu acho que consumir roupas e calçados que têm um ciclo de vida útil mais longo é efetivo para reduzir danos sociais e ambientais na indústria têxtil	1	2	3	4	5
Eu acho que eu posso contribuir para a redução de danos sociais e ambientais consumindo roupas e calçados que têm um ciclo de vida útil mais longo	1	2	3	4	5
Eu acho que reutilizar minhas roupas e calçados é efetivo para reduzir danos sociais e ambientais na indústria têxtil	1	2	3	4	5
Eu acho que eu posso contribuir para a redução de danos sociais e ambientais reutilizando minhas roupas e calçados	1	2	3	4	5
Eu acho que reparar e estender o uso das minhas roupas e calçados são efetivos para reduzir danos sociais e ambientais na indústria têxtil	1	2	3	4	5

Eu acho que eu posso contribuir para a redução de danos sociais e ambientais reparando e estendendo o uso das minhas roupas e calçados	1	2	3	4	5

5.5. Considere os quatro modelos de negócio descritos.
Extensão da vida útil do produto – Novos produtos são projetados para serem duradouros.
Reuso facilitado - Reuso com ou sem reparo/modernização
Design modular de produto - Partes de produtos podem ser substituídas para serem atualizadas/modernizadas sem substituir o item inteiro.
Renovar, reparar, remanufaturar e recondicionar - Produto ganha uma outra vida útil e o produtor pode colocar o produto de volta no mercado para ganhar uma segunda renda ou uma renda subsequente, de um segundo usuário ou de um usuário subsequente.

Indique o quanto você concorda ou discorda com as afirmações a seguir.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Roupas e calçados com ciclo de vida útil mais longo estão facilmente disponíveis	1	2	3	4	5
Roupas e calçados com ciclo de vida útil mais longo são mais caros que roupas e sapatos comuns	1	2	3	4	5
Roupas e calçados com ciclo de vida útil mais longo são menos elegantes que roupas e sapatos comuns	1	2	3	4	5
Consumir roupas e calçados com ciclo de vida útil mais longo depende de mim	1	2	3	4	5
Roupas e calçados com ciclo de vida útil mais longo combinam com meu estilo de vida	1	2	3	4	5
Roupas e calçados reutilizáveis são facilmente disponíveis	1	2	3	4	5
Roupas e calçados reutilizáveis são mais caros que roupas e sapatos comuns	1	2	3	4	5
Roupas e calçados reutilizáveis são menos elegantes que roupas e sapatos comuns	1	2	3	4	5
Consumir roupas e calçados reutilizáveis depende de mim	1	2	3	4	5
Roupas e calçados reutilizáveis combinam com meu estilo de vida	1	2	3	4	5
Roupas e calçados modulares e modernizáveis estão facilmente disponíveis	1	2	3	4	5

Roupas e calçados modulares e modernizáveis são mais caros que roupas e sapatos comuns	1	2	3	4	5
Roupas e calçados modulares e modernizáveis são menos elegantes que roupas e sapatos comuns	1	2	3	4	5
Consumir roupas e calçados modulares e modernizáveis depende de mim	1	2	3	4	5
Roupas e calçados modulares e modernizáveis combinam com meu estilo de vida	1	2	3	4	5
Roupas e calçados reparados, remanufaturados ou recondicionados estão facilmente disponíveis	1	2	3	4	5
Roupas e calçados reparados, remanufaturados ou recondicionados são mais caros que roupas e sapatos comuns	1	2	3	4	5
Roupas e calçados reparados, remanufaturados ou recondicionados são menos elegantes que roupas e sapatos comuns	1	2	3	4	5
Consumir roupas e calçados reparados, remanufaturados ou recondicionados depende de mim	1	2	3	4	5
Roupas e calçados reparados, remanufaturados ou recondicionados combinam com meu estilo de vida	1	2	3	4	5

5.6. Leia as afirmações abaixo e indique se você ou discorda delas.

	Discordo totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo totalmente
Eu estou disposto(a) a pagar mais por uma peça de vestuário que é mais durável	1	2	3	4	5
Eu estou disposto(a) a pagar mais por uma peça de vestuário que pode ser modernizada	1	2	3	4	5
Eu estou disposto(a) a pagar mais por uma peça de vestuário remanufaturadas	1	2	3	4	5
Roupas duráveis podem trazer uma economia de dinheiro ao longo do tempo	1	2	3	4	5

A maioria das pessoas usa roupas que são duráveis e fáceis de reparar	1	2	3	4	5
Roupas éticas e sustentáveis são caras	1	2	3	4	5

Seção 6 – Demografia

As questões a seguir tratam de informações demográficas.

6.1. Qual o seu gênero

- ❑ Feminino
- ❑ Masculino
- ❑ Transexual
- ❑ Outro: _____
- ❑ Eu prefiro não declarar

6.2. Qual a sua idade? (Ex.: 25) _____

6.3. Qual a sua nacionalidade (Ex.: Brasileiro(a)) _____

6.4. Qual é a sua renda familiar média? Se você não tiver certeza, forneça sua melhor estimativa.

- ❑ Menos que 1000 reais líquidos por mês
- ❑ Entre 1000 e 1999 reais líquidos por mês
- ❑ Entre 2000 e 2999 reais líquidos por mês
- ❑ Entre 3000 e 3999 reais líquidos por mês
- ❑ Entre 4000 e 4999 reais líquidos por mês
- ❑ 5000 reais líquidos por mês ou mais
- ❑ Prefiro não declarar

Appendices 3 – Survey in Dutch

Informatie over het onderzoek

Waarom krijg ik deze informatie?
U bent uitgenodigd voor dit onderzoek omdat u deel uitmaakt van het panel van panelinzicht. De Ethische Commissie van de afdeling Psychologie van de Rijksuniversiteit Groningen heeft dit onderzoek getoetst. Ellen van der Werff van de Rijksuniversiteit Groningen voert dit onderzoek uit samen met Giovana Gomes van de University of Sao Paolo, Brazilië.
Moet ik meedoen aan dit onderzoek?
Meedoen aan het onderzoek is vrijwillig. Wel is uw toestemming nodig. Lees deze informatie daarom goed door. Als u besluit om niet mee te doen, hoeft u niet uit te leggen waarom, en zal dit geen negatieve gevolgen voor u hebben.
Waarom dit onderzoek?
Het doel van dit onderzoek is om meer inzicht te krijgen in de meningen en overtuigingen van kledingconsumenten en de invloed van deze overtuigingen op hun gedrag.
Wat vragen we van u tijdens het onderzoek?
We zullen u vragenlijsten voorleggen met vragen over uw kledingconsumptie en vragen over wat u belangrijk vindt. Tot slot zullen we u een aantal vragen stellen over leeftijd en opleidingsniveau om te kijken of we een representatieve steekproef hebben. Het invullen van de vragenlijsten duurt ongeveer 20 minuten. U ontvangt van panelinzicht een vergoeding voor deelname.
Hoe gaan we met uw gegevens om?
De gegevens, die tijdens dit onderzoek verzameld worden, zullen vertrouwelijk behandeld worden. De onderzoekers hebben geen toegang tot eventuele persoonsgegevens uit uw panelinzicht account. Uw onderzoeksgegevens worden door de onderzoekers op groepsniveau geanalyseerd. Onderzoeksgegevens die worden gepubliceerd, bijvoorbeeld in wetenschappelijke tijdschriften, zijn niet tot u te herleiden. Onderzoeksgegevens kunnen voor wetenschappelijke doeleinden worden gedeeld met andere onderzoekers.
Wat moet u nog meer weten?
U kunt altijd vragen stellen over het onderzoek: nu, tijdens het onderzoek, en na afloop. Dit kan door een van de hoofdonderzoekers te e-mailen (ellen.van.der.werff@rug.nl) of te bellen (050-3639098). Heeft u vragen of zorgen over uw rechten als onderzoeksdeelnemer? Hiervoor kunt u ook contact opnemen met de Ethische Commissie Psychologie van de Rijksuniversiteit Groningen: ecp@rug.nl. Heeft u vragen of zorgen over uw privacy, of over hoe er met uw persoonsgegevens wordt omgegaan? Hiervoor kunt u ook contact opnemen met de Functionaris Gegevensbescherming van de Rijksuniversiteit Groningen: privacy@rug.nl.

Sectie 2

2.1. Hieronder staan 16 waarden. Achter elke waarde wordt een korte toelichting gegeven over de betekenis van de waarde. Geef voor iedere waarde aan hoe belangrijk deze is als leidraad in uw leven. De betekenis van de scores is als volgt:

(-1) betekent dat de waarde ingaat tegen uw principes
(0) betekent dat de waarde niet belangrijk is; de waarde is niet relevant als leidraad in uw leven.
(3) betekent dat de waarde belangrijk is als leidraad in uw leven.
(6) betekent dat de waarde zeer (heel erg) belangrijk is als leidraad in uw leven.

(7) betekent dat de waarde uiterst belangrijk voor u is als leidraad in uw leven. Gewoonlijk heeft iemand niet meer dan twee waarden waar een 7 aan toegekend wordt.

Uw scores kunnen variëren van –1 tot 7. Hoe hoger het cijfer (-1, 0, 1, 2, 3, 4, 5, 6, 7) hoe belangrijker de waarde is als leidraad in jouw leven. Probeer zoveel mogelijk onderscheid te maken tussen het belang van de waarden door verschillende cijfers te gebruiken.

	gaat in tegen mijn principes	niet belangrijk	belangrijk					zeer belangrijk	uiterst belangrijk
GELIJKHEID: gelijke kansen voor iedereen	-1	0	1	2	3	4	5	6	7
RESPECT VOOR DE AARDE: in harmonie leven met andere soorten	-1	0	1	2	3	4	5	6	7
MACHT: controle over andere mensen, dominantie	-1	0	1	2	3	4	5	6	7
PLEZIER: genot, vervulling van verlangens	-1	0	1	2	3	4	5	6	7
EENHEID MET DE NATUUR: je verbonden voelen met de natuur	-1	0	1	2	3	4	5	6	7
EEN VREEDZAME WERELD: vrij van oorlog en conflict	-1	0	1	2	3	4	5	6	7
RIJKDOM: materiële bezittingen, geld	-1	0	1	2	3	4	5	6	7
GEZAG: het recht om te leiden of op te dragen	-1	0	1	2	3	4	5	6	7
SOCIALE RECHTVAARDIGHEID: herstel van onrecht, zorg voor zwakken	-1	0	1	2	3	4	5	6	7
GENIETEN VAN HET LEVEN: van eten, seks, ontspanning, etc.	-1	0	1	2	3	4	5	6	7
BESCHERMING VAN HET MILIEU: behoud van milieukwaliteit en de natuur	-1	0	1	2	3	4	5	6	7
INVLOEDRIJK: invloed hebben op mensen en gebeurtenissen	-1	0	1	2	3	4	5	6	7
BEHULPZAAMHEID: werken voor het welzijn van anderen	-1	0	1	2	3	4	5	6	7
MILIEUVERVUILING VOORKOMEN: natuurlijke hulpbronnen beschermen	-1	0	1	2	3	4	5	6	7
JEZELF VERWENNEN: aangename dingen doen	-1	0	1	2	3	4	5	6	7
AMBITIEUS: hardwerkend, eerzuchtig, strevend	-1	0	1	2	3	4	5	6	7

2.2. Lees onderstaande stellingen alstublieft en geef aan of u het met de stelling eens bent op een schaal van 1 ‘helemaal mee oneens’ tot 5 ‘helemaal mee eens’.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Ik bewonder mensen die dure huizen, auto’s en kleren bezitten	1	2	3	4	5
De dingen die ik bezit zeggen veel over hoe goed het in mijn leven gaat	1	2	3	4	5
Ik houd ervan om dingen te bezitten die indruk maken op mensen	1	2	3	4	5
Ik probeer mijn leven zo simpel mogelijk te houden wat betreft bezittingen	1	2	3	4	5
Ik vind het leuk om geld uit te geven aan spullen die niet praktisch zijn	1	2	3	4	5
Ik houd van luxe in mijn leven	1	2	3	4	5
Mijn leven zou beter zijn als ik bepaalde spullen zou bezitten die ik nu niet heb	1	2	3	4	5
Ik zou gelukkiger zijn als ik meer spullen zou kunnen betalen	1	2	3	4	5
Ik vind het soms behoorlijk vervelend dat ik niet alles kan kopen wat ik zou willen	1	2	3	4	5

Sectie 3
Onderstaande vragen gaan over uw consumptiegedrag van kleding.

3.1. Hoe vaak koopt u één of meerdere kledingstukken (kleding, schoenen, accessoires)?

- ❑ Minstens één keer per week
- ❑ Elke twee weken
- ❑ Eén keer per maand
- ❑ Elke 3 maanden
- ❑ Elke 6 maanden
- ❑ Eén keer per jaar

3.2. Waar koopt u uw kleding en schoenen het liefst?

- ❑ Winkels (aan een straat)
- ❑ Winkels (in winkelcentra)
- ❑ Online
- ❑ Anders: _____

3.3. Hoeveel kledingstukken (kleding, schoenen, accessoires) koopt u per jaar? Maak alstublieft een schatting als u het niet zeker weet. _____

3.4. Hoe lang draagt u uw broeken meestal voordat u ze weg doet (doneren, weggooien, recyclen, etc.)? Geef alstublieft een schatting in maanden (bijv. 12 maanden).
Maak alstublieft een schatting als u het niet zeker weet. _____

3.5. Hoe lang draagt u uw shirts, tops en t-shirts meestal voordat u ze weg doet (doneren, weggooien, recyclen, etc.)? Geef uw antwoord in maanden (bijv. 12 maanden).
Maak alstublieft een schatting als u het niet zeker weet. _____

3.6. Hoe lang draagt u uw jassen en truien meestal voordat u ze weg doet (doneren, weggooien, recyclen, etc.)? Geef uw antwoord in maanden (bijv. 12 maanden).
Maak alstublieft een schatting als u het niet zeker weet. _____

3.7. Hoe lang draagt u uw schoeisel (sneakers, laarzen, etc.) meestal voordat u ze weg doet (doneren, weggooien, recyclen, etc.)? Geef uw antwoord in maanden (bijv. 12 maanden).
Maak alstublieft een schatting als u het niet zeker weet. _____

3.8. Geef alstublieft aan hoe vaak u uw kleding en schoenen op de volgende manieren wegdoet:

	Nooit	Zelden	Soms	Vaak	Altijd
Weggooien met het restafval	1	2	3	4	5
Doneren	1	2	3	4	5
Wegbrengen voor recycling (in een zak of container)	1	2	3	4	5

3.9. Geef alstublieft aan hoe belangrijk de volgende aspecten voor u zijn als u kledingstukken (kleding, schoenen, accessoires) aanschaft. U kunt antwoorden op een schaal van 1 (helemaal niet belangrijk) tot 5 (uiterst belangrijk).

	Helemaal niet belangrijk	Een beetje belangrijk	Redelijk belangrijk	Heel belangrijk	Uiterst belangrijk
Merk	1	2	3	4	5
Comfort	1	2	3	4	5
Design/Mode	1	2	3	4	5
Levensduur	1	2	3	4	5
Prijs	1	2	3	4	5
Duurzaamheid	1	2	3	4	5

Sectie 4

4.1. Onderstaande vragen gaan over uw overtuigingen. Er zijn geen goede of foute antwoorden, kies alstublieft de eerste optie die in u opkomt. Met 'snelle mode' (fast-fashion) wordt goedkope, trendy kleding bedoeld. Kleding waarin ideeën van de catwalk of van beroemdheden worden gebruikt en die snel als kledingstukken in de winkels te zien zijn. Geef voor onderstaande stellingen alstublieft op een schaal van 1 (helemaal mee oneens) tot 5 (helemaal mee eens) aan in welke mate u het er mee eens bent.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
De productie en consumptie van snelle mode veroorzaakt belangrijke maatschappelijke problemen	1	2	3	4	5
De productie en consumptie van snelle mode veroorzaakt ernstige milieu problemen	1	2	3	4	5
Ik maak me zorgen over sociale en milieu gevolgen van snelle mode/ de kledingindustrie	1	2	3	4	5
Als ik mijn consumptie van snelle mode verminder, draag ik bij aan het verminderen van sociale en milieuproblemen veroorzaakt door snelle mode	1	2	3	4	5

4.2. Geef alstublieft aan in welke mate de volgende stellingen waar zijn voor **u persoonlijk**. Ik voel me…

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
...moreel verplicht om sociale en milieuschade veroorzaakt door de mode industrie te voorkomen	1	2	3	4	5
...moreel verplicht om iets te doen zodat sociale en milieu schade veroorzaakt door de textiel industrie wordt voorkomen	1	2	3	4	5
…niet verplicht om iets te doen om sociale en milieuschade in de textiel industrie te stoppen	1	2	3	4	5

4.3. Geef alstublieft aan in welke mate de volgende stellingen waar zijn voor de **samenleving als geheel**.
Wij zijn…

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
...moreel verplicht om sociale en milieuschade veroorzaakt door de mode industrie te voorkomen	1	2	3	4	5
...moreel verplicht om iets te doen zodat sociale en milieu schade veroorzaakt door de textiel industrie wordt voorkomen	1	2	3	4	5
…niet verplicht om iets te doen om sociale en milieuschade in de textiel industrie te stoppen	1	2	3	4	5

4.4. Geef alstublieft aan in welke mate de volgende stellingen waar zijn voor **u persoonlijk**.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Ik ben het type persoon dat milieuvriendelijk handelt	1	2	3	4	5
Milieuvriendelijk handelen is een belangrijk deel van wie ik ben	1	2	3	4	5
Ik zie mijzelf als een milieuvriendelijk persoon	1	2	3	4	5

Sectie 5

Circulaire mode
In dit onderdeel willen we graag uw mening weten over producten en diensten gericht op circulaire mode. De circulaire economie gaat verder dan het huidige neem-maak-weggooi model. Het richt zich op maatschappelijke belangen. De circulaire economie is een innovatieve manier om waarde te creëren vanuit het oogpunt van de industrie, door materialen te hergebruiken, door afval uit het productieproces te halen, door gebruik te maken van automatisering en door waarde te verspreiden. Vanuit het perspectief van consumenten kan de circulaire economie waarde creëren door diensten en producten efficiënter aan te bieden, te delen, en het gebruik te vergroten. De circulaire economie kan dus voordelig zijn voor bedrijven en consumenten.Er zijn verschillende bedrijfsmodellen die geïmplementeerd kunnen worden binnen de circulaire economie. Dit onderzoek richt zich alleen op het verlengen van de levensduur van producten en hergebruik. Dat kan worden gedaan op vier manieren:

- De levensduur van producten verlengen – Nieuwe producten worden zo ontwikkeld dat ze langer meegaan.
  Bijvoorbeeld: Sneakers worden zo ontworpen dat ze gemakkelijk gerepareerd kunnen worden indien nodig.

- Hergebruik gemakkelijker maken – Hergebruik met of zonder gratis reparatie/ verbeteringen.
  Bijvoorbeeld: Jassen die door de fabrikant kunnen worden gerepareerd en worden teruggegeven aan de klant, of die later verkocht kunnen worden.

- Modulair product ontwerp – Producten worden modulair ontworpen zodat onderdelen vervangen/ geüpgraded kunnen worden zonder dat het gehele product vervangen moet worden.
  Bijvoorbeeld: Modulaire jassen die door de consument herontworpen kunnen worden door, afhankelijk van het weer, lagen toe te voegen of te verwijderen.

- Opknappen, repareren, en aanpassen – Het product krijgt een nieuw leven (bijvoorbeeld na aanpassingen waarbij het product of een deel ervan in zo goed als nieuwe staat wordt hersteld). Dit stelt de producent in staat om het product weer opnieuw in de markt te zetten en er opnieuw geld aan te verdienen.
  Bijvoorbeeld: Dekens gemaakt van gebruikte t-shirts (of andere producten).

5.1. Geef alstublieft aan in welke mate u het eens bent met de volgende stellingen op een schaal van 1 (helemaal mee oneens) tot 5 (helemaal mee eens).
Ik ben bereid om…

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
… minder kledingstukken aan te schaffen (kleding en schoenen) als die een langere levensduur hebben	1	2	3	4	5
… meer te betalen als kledingstukken (kleding en schoenen) een langere levensduur hebben	1	2	3	4	5
… mijn kleding en schoenen te hergebruiken als ze te repareren zijn (te upgraden)	1	2	3	4	5
… tweedehands kledingstukken te kopen	1	2	3	4	5
… kleding en schoenen met een modulair product ontwerp te proberen	1	2	3	4	5
… kleding te kopen die is opgeknapt/ gerepareerd/ aangepast	1	2	3	4	5
… mijn kleding en schoenen te recyclen	1	2	3	4	5

5.2. Geef alstublieft aan in welke mate de volgende stellingen waar zijn voor **u persoonlijk.**

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Ik voel me moreel verplicht om kleding en schoenen te kopen die een langere levensduur hebben	1	2	3	4	5
Ik voel me moreel verplicht om mijn kleding en schoenen te repareren/ verbeteren en te hergebruiken	1	2	3	4	5
Ik voel me moreel verplicht om mijn kleding en schoenen te herstellen en de levensduur ervan te verlengen	1	2	3	4	5
Ik zou me schuldig voelen als ik kleding en schoenen zou kopen met een korte levensduur	1	2	3	4	5
Ik zou me schuldig voelen als ik mijn kleding en schoenen niet zou repareren / verbeteren en hergebruiken	1	2	3	4	5
Ik zou me schuldig voelen als ik mijn kleding en schoenen niet zou repareren en de levensduur niet zou verlengen	1	2	3	4	5
Ik zou me trots voelen als ik kleding en schoenen zou kopen die een langere levensduur hebben	1	2	3	4	5
Ik zou me trots voelen als ik mijn kleding en schoenen zou repareren / verbeteren en hergebruiken	1	2	3	4	5
Ik zou me trots voelen als ik mijn kleding en schoenen zou repareren en de levensduur zou verlengen	1	2	3	4	5

5.3. In welke mate denkt u dat een **gemiddelde Nederlander** het eens is met de onderstaande stellen?

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Ik voel me moreel verplicht om kleding en schoenen te kopen die een langere levensduur hebben	1	2	3	4	5
Ik voel me moreel verplicht om mijn kleding en schoenen te repareren / verbeteren en te hergebruiken	1	2	3	4	5

Ik voel me moreel verplicht om mijn kleding en schoenen te repareren en de levensduur ervan te verlengen	1	2	3	4	5
Ik zou me schuldig voelen als ik kleding en schoenen zou kopen met een korte levensduur	1	2	3	4	5
Ik zou me schuldig voelen als ik mijn kleding en schoenen niet zou repareren / verbeteren en hergebruiken	1	2	3	4	5
Ik zou me schuldig voelen als ik mijn kleding en schoenen niet zou repareren en de levensduur niet zou verlengen	1	2	3	4	5
Ik zou me trots voelen als ik kleding en schoenen zou kopen die een langere levenscyclus hebben	1	2	3	4	5
Ik zou me trots voelen als ik mijn kleding en schoenen zou repareren / verbeteren en hergebruiken	1	2	3	4	5
Ik zou me trots voelen als ik mijn kleding en schoenen zou repareren en de levensduur zou verlengen	1	2	3	4	5

5.4. Geef alstublieft aan in welke mate u het eens bent met de volgende stellingen.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Kleding en schoenen kopen met een langere levenscyclus is effectief in het verminderen van sociale en milieuschade in de textielindustrie	1	2	3	4	5
Ik kan bijdragen aan het verminderen van sociale en milieuproblemen door kleding en schoenen te consumeren met een langere levenscyclus	1	2	3	4	5
Ik denk dat het repareren / verbeteren en hergebruiken van mijn kleding en schoenen effectief is in het verminderen van sociale en milieu problemen in de textiel industrie	1	2	3	4	5
Ik denk dat ik kan bijdragen aan het verminderen van sociale en milieuproblemen door mijn kleding en schoenen te repareren / verbeteren en te hergebruiken	1	2	3	4	5
Het repareren en de levensduur verlengen van kleding en schoenen is effectief in het verminderen van sociale en milieuschade in de textiel industrie	1	2	3	4	5

Ik denk dat ik kan bijdragen aan het verminderen van sociale en milieuproblemen door mijn kleding te repareren en het gebruik te verlengen	1	2	3	4	5

5.5. Denk alstublieft aan de vier bedrijfsmodellen zoals eerder omschreven.
De levensduur van producten verlengen – Nieuwe producten worden ontworpen met een lange levensduur.
Hergebruik gemakkelijker maken – Hergebruik met of zonder reparatie/ verbeteringen.
Modulair product ontwerp – Delen van het product kunnen worden vervangen/ geüpgraded zonder dat het gehele product vervangen moet worden.
Opknappen, repareren, en aanpassen – Het product krijgt een nieuw leven en de producent kan het product opnieuw in de markt zetten om er opnieuw inkomen aan te verdienen van een volgende gebruiker.
Geef alstublieft aan in welke mate u het eens bent met de volgende stellingen.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Kleding en schoenen met een lange levensduur zijn gemakkelijk verkrijgbaar	1	2	3	4	5
Kleding en schoenen met een lange levensduur zijn duurder dan gangbare kleding en schoenen	1	2	3	4	5
Kleding en schoenen met een lange levensduur zijn minder modieus dan gangbare kleding en schoenen	1	2	3	4	5
Het is aan mij of ik kleding en schoenen met een lange levensduur koop	1	2	3	4	5
Kleding en schoenen met een lange levensduur passen bij mijn lifestyle	1	2	3	4	5
Herbruikbare en te upgraden kleding en schoenen zijn gemakkelijk verkrijgbaar	1	2	3	4	5
Herbruikbare en te upgraden kleding en schoenen zijn duurder dan gangbare kleding en schoenen	1	2	3	4	5
Herbruikbare en te upgraden kleding en schoenen zijn minder modieus dan gangbare kleding en schoenen	1	2	3	4	5
Het is aan mij of ik herbruikbare en te upgraden kleding en schoenen koop	1	2	3	4	5
Herbruikbare en te upgraden kleding en schoenen passen bij mijn lifestyle	1	2	3	4	5
Modulaire en geüpgradede kleding en schoenen zijn gemakkelijk te verkrijgen	1	2	3	4	5

Modulaire en geüpgradede kleding en schoenen zijn duurder dan gangbare kleding en schoenen	1	2	3	4	5
Modulaire en geüpgradede kleding en schoenen zijn minder modieus dan gangbare kleding en schoenen	1	2	3	4	5
Het is aan mij of ik modulaire en geüpgradede kleding en schoenen koop	1	2	3	4	5
Modulaire en geüpgradede kleding en schoenen passen bij mijn lifestyle	1	2	3	4	5
Opgeknapte, gerepareerde en aangepaste kleding en schoenen zijn gemakkelijk te verkrijgen	1	2	3	4	5
Opgeknapte, gerepareerde en aangepaste kleding en schoenen zijn duurder dan gangbare kleding en schoenen	1	2	3	4	5
Opgeknapte, gerepareerde en aangepaste kleding en schoenen zijn minder modieus dan gangbare kleding en schoenen	1	2	3	4	5
Het is aan mij of ik opgeknapte, gerepareerde en aangepaste kleding en schoenen koop	1	2	3	4	5
Opgeknapte, gerepareerde en aangepaste kleding en schoenen passen bij mijn lifestyle	1	2	3	4	5

5.6. Geef alstublieft aan in welke mate u het eens bent met de volgende stellingen.

	Helemaal mee oneens	Oneens	Niet eens en niet oneens	Eens	Helemaal mee eens
Ik ben bereid om meer te betalen voor kledingstukken met een langere levensduur	1	2	3	4	5
Ik ben bereid om meer te betalen voor kledingstukken die verbeterd kunnen worden	1	2	3	4	5
Ik ben bereid om meer te betalen voor kledingstukken die gerepareerd kunnen worden	1	2	3	4	5
Kledingstukken met een langere levensduur besparen op termijn geld	1	2	3	4	5
De meeste mensen hebben kledingstukken die langer meegaan en gemakkelijk te repareren zijn	1	2	3	4	5
Ethische en duurzame kledingstukken zijn duur	1	2	3	4	5

Sectie 6

Tot slot willen we u graag een aantal algemene vragen stellen zodat we kunnen bepalen of we een representatieve steekproef hebben.

6.1. Ik ben een

- ❏ Vrouw
- ❏ Man
- ❏ Transgender
- ❏ Anders: _____
- ❏ Zeg ik liever niet

6.2. Wat is uw leeftijd? (Bijv.: 25) _____

6.3. Wat is uw nationaliteit? (Bijv.: Nederlands) _____

6.4. Wat is uw gemiddelde huishoudelijk inkomen? Als u het niet zeker weet, maak alstublieft een schatting.

- ❏ Minder dan €1.000 netto per maand
- ❏ €1.000-1.999 netto per maand
- ❏ €2.000-2.999 netto per maand
- ❏ €3.000-3.999 netto per maand
- ❏ €4.000-4.999 netto per maand
- ❏ €5.000 of meer netto per maand
- ❏ Zeg ik liever niet

Appendices 4 – Interview schedule

CIRCULAR BUSINESS MODEL

- What is the circular economy strategy adopted by your brand?
- What differentiates your product from competitors?
- Does your organization have any certification related to sustainability or circularity? If yes, which one(s)? If not, why?
- Do sustainable products result in a higher profit margin? Do they compete with other 'linear' products?
- Does your brand offer any customer support services? For example, extended warranty or repair?
- What is the impact of consumers' expectations on product design, in terms of appearance, material perception, usability and quality?
  - How does your brand measure this (indicators)?
  - For non-100% circular companies – differences between linear (traditional) and circular products.
- Was the consumers' familiarity with the type of circular business model adopted (explain based on the company in question) a decisive factor for its adoption?
- Do you believe that an easily available and convenient product is a decisive factor for <u>your</u> consumer?

COMMUNICATION AND MARKETING

- What strategies does your company use to reach its target audience? (in terms of communication)
- What are the main platforms your brand uses to communicate with consumers?
- Do you believe that your company's image helps it reaches consumers who are looking for circular products?
- Do your brand's consumers demand business transparency?
- How does the company disclose information about the sustainable products/services offered?
- Are your brand's marketing and communication strategies aimed at which consumer profile? (Target audience)
- Has your brand ever carried out interventions or used persuasive communication (whose objective is to change some type of behavior pattern, eg, exacerbated consumption)? If yes, did it obtain the expected result(s)?
- What communication and marketing strategies does your company believe to have the greatest potential to generate engagement of circular consumers?
- For multinational companies – Are there comparative data between consumers and communication strategies across different countries? If there are differences across countries - What motivates these differences?

CONSUMERS' PROFILE

Sociodemographic factors

- Is your brand able to draw a clear profile of its consumers? (gender, age, education, income, etc.)?
  - For non-100% circular companies – Is the profile of consumers of circular apparel different?

For companies with more than one circular business model - Does the consumer profile change according to the adopted CBM?

- Do your brands' customers pay more for sustainable products?

Psychological factors

- Do you believe that consumers are becoming more concerned about sustainability and circular economy issues?
- Does the consumer who purchased circular products or services from your brand understand sustainability as a differentiator or a decisive factor?
- Is your brand aware of customers' psychological factors (eg, beliefs, values, motivations, etc.) that can leverage or decrease their engagement?
- Does your brand believe that it is important to be aware of these psychological factors?

Final question:
What are your company's biggest challenges in terms of promoting circular consumption and consumer engagement?