



Transformative circular futures in the textile and apparel value chain: Guiding policy and business recommendations in the Netherlands, Spain, and India.

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ABSTRACT

Circular economy practices are gaining importance in the global textile and apparel value chain to promote sustainability. However, the lack of attention paid to the circular economy's social dimension is concerning, given its expected global implementation for 2050. Neglecting this social impact undermines both environmental and social sustainability, perpetuating industry inequalities. To address this problem, this study develops Transformative Circular Futures (TCFs) to inform policy and business decision-making in the textile and apparel value chains of India, the Netherlands and Spain. TCFs are co-created circular economy scenarios that are diverse, systemic, and embedded with social impact considerations. This research employs participatory methods to blend system-change, Circular Economy, social impacts (through a gender lens), and positive desirable futures approaches, resulting in 16 scenarios. The results emphasise the pivotal role of diverse stakeholder engagement in reshaping the textile and apparel value chain towards equitable and transformative circular economy futures. The TCFs-derived recommendations to reduce inequalities and improve workers' well-being are critical steps towards a more inclusive and equitable transition to circular practices in the textile and apparel sector. Common recommendations include normalising living wages for direct, indirect, and informal workers, implementing regulations challenging patriarchy, eliminating gender pay and establishing permanent global committees of social actors. This ensures that social considerations are integrated throughout national and international negotiations within the circular textile and apparel value chain.

1. Introduction

The textile and apparel value chain (TAVC) is a complex global system of industries extending over different geographies. It comprises an abundant number of large and small businesses and has been considered one of the most polluting industries (Niinimäki, 2018; Kaplinsky and Morris, 2000; Porter, 1998; WBCSD, 2014). The TAVC employs more than 10% of the global workforce and is mainly characterised by poor working conditions from the extraction stage to the end-of-life (EOL) segment (Suarez-Visbal et al., 2022a). Women constitute more than 75% of this workforce and are over-represented in the most vulnerable jobs (Fletcher and Tham, 2014; Neetha, 2002; Ascoly, 2009). To achieve sustainable development, the sector has seen the rise of circular economy (CE) practices (Kirchherr et al., 2017; Repp et al., 2021; Köhler et al., 2021). However, several scholars have highlighted the lack of policy ambitions and disregard for the social

dimension of CE practices within the TAVC, particularly its impact on workers and communities (Suarez-Visbal et al., 2022a), (Llorente-González and Vence, 2020; BSR, 2021a; Suarez-Visbal et al., 2022b). According to these studies, many prevailing CE strategies emulate the linear value chain model by perpetuating questionable working conditions, low payment, and the feminisation of its workforce. These findings indicate that by adopting circularity in the sector, workers and communities are not necessarily better off (Suarez-Visbal et al., 2022a), (Repp et al., 2021), (BSR, 2021a). Such an outcome is problematic considering that sectoral and national plans worldwide are aiming at achieving high degrees of CE by 2050 (De los Rios and Charnley, 2017; Elia et al., 2017; Geissdoerfer et al., 2017; Stahel, 2016; Witjes and Lozano, 2016). Hence, if circularity is perpetuated in its current form without due consideration of its societal implications, the prospect of achieving social sustainability alongside environmental sustainability is at risk. This will inadvertently reinforce patterns of oppression and worsen existing inequalities within the sector.

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Abbreviations

CE	circular economy
CS	circular strategies
TAVC	textile and apparel value chain
GEC	gender equality continuum
IGWG	International Gender Working Group
PDFs	positive desirable futures
PPF	positive future framework
TS	transformative scenarios
TCFs	transformative circular futures
QOJ	quality of jobs
SL	sustainable livelihood/well-being
GE&I	gender equality and inclusion
LOFs	letters of the future
EPR	extended producer responsibility
EOL	end-of-life
BAU	business as usual

Studies about the future and how it can affect our present, have been used to influence policy and guide practical action towards sustainability (Andersson, 2018; Candy and Dunagan, 2017; Miller, 2018; Edwards, 2010; Weigend Rodríguez et al., 2019). The interest in future studies has increased significantly in the last few years to guide the CE transition, which, in the context of the TAVC, has resulted in CE future papers such as (BSR, 2021a), (Oomen et al., 2022; Muñoz, 2009; Tham, 2015; Buchel et al., 2018; Vaccari and Vanni, 2021). However, CE future studies are scarce, poorly integrated and present several shortcomings that should be addressed to support an effective sustainable CE transition (Bauwens et al., 2020; Svenfelt et al., 2019; Dufva et al., 2017). First, most of these “CE future” studies shared similar characteristics with current CE narratives, as they are also asymmetrical, focusing on the techno-environmental dimension and missing the social one. Second, future CE visualisations fail to incorporate a systems perspective (Pauliuk, 2018; Lacovidou et al., 2020). In addition, authors such as (Calisto Friant et al., 2020) refer to the necessity of including alternative ideologies, co-developing methodologies, and diverse voices in the making of CE futures. Finally, most of these studies are euro-centric, lacking the necessary geographical representation of the global south present in the TAVC (Swyngedouw).

Considering these findings, we need to develop transformative futures, i.e., alternative future scenarios that are system-oriented, socially proactive, desirable, and inclusive (Markard et al., 2012). Only by co-creating such futures are we able to effectively guide and inform policy and business practices of the CE transition in the TAVC.

To fill these gaps, the following research question will be addressed:

1.1. How could transformative circular futures inform policymakers and industry to improve the social impact for workers involved in circular strategies in the TAVC?

This paper aims to provide business and policy with recommendations that could improve the present social makeup of the CE in the TAVC. The paper is organised as follows: Section 2 covers the theoretical background on CE, combining future studies, systems thinking and social impact; Section 3 describes the different methods adopted; Section 4 contains the results of the future exercises in the Netherlands, Spain, and India; in Section 5, discussion, limitations, and future research are addressed; followed by conclusions and implications for research in Section 6.

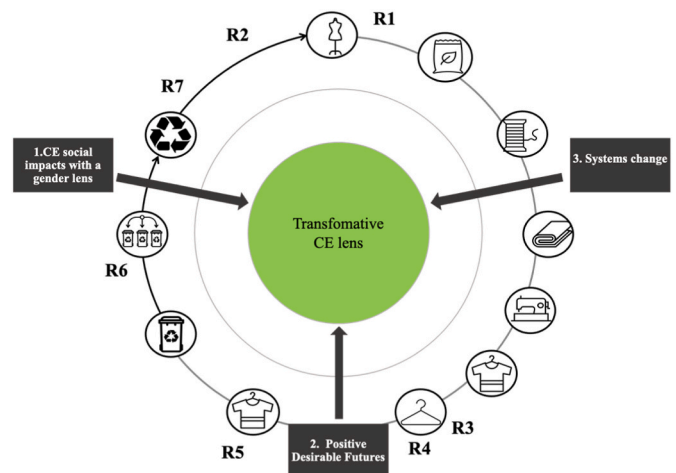
2. Theory

The CE is understood as an economic system which replaces the “end-of-life” concept with circular strategies such as reducing, reusing, recycling, and recovering materials in production/distribution and consumption processes (Kirchherr et al., 2017). It operates at the micro, meso, and macro level to accomplish sustainable development, creating environmental quality, economic prosperity, and social equity for current and future generations’ [9, p. 224]. According to (Suarez-Visbal et al., 2022a), (Suarez-Visbal et al., 2022b), (Battesini Teixeira et al., 2023), circularity in the TAVC is still in its infancy. It is operationalised mainly through seven circular strategies, often called ‘R-strategies’,¹ depicted in Fig. 1.

This study uses CE transformation as a point of convergence between CE social impacts, systems thinking, and future studies, as shown in Fig. 1. Transformative CE is seen as a critical departure point from the status-quo where social impacts and gender inequalities considerations are addressed (left side of figure) and integrated across CE practices on the TAVC (outer circle). Within future studies, the positive desirable future approach (low-centre of the figure), defines transformative scenarios as co-created with the participation of diverse voices and contexts. This contributes to socially rich sustainability visions of the future. Finally, in system change theory (right side of figure), transformation is considered the deepest level of systemic change, and it is achieved when different system conditions operate simultaneously at different system-change levels. These three dimensions of our Transformative CE lens will be explained in subsections 2.1, 2.2 and 2.3.

2.1. CE social impacts in the TAVC

The TAVC encompasses a variety of workers, from direct employees to entrepreneurs, contractual blue-collar workers, and informal workers (Suarez-Visbal et al., 2022a). Many authors agree that the current application of CE in the sector does not necessarily consider the social bearings of this diverse workforce (Miller, 2018), (Ghisellini et al., 2016), (Merli et al., 2018). For instance, while (Pal, 2017) and (Dis-



Source: Own elaboration inspired on [39]

Fig. 1. Three Dimension of the transformative CE Lens used in this research. Source: Own elaboration inspired on (Suarez-Visbal et al., 2023).

¹ Which Include R1 Redesign, R2 Reduce/Use or Recover material, R3 Rental, R4 Resale, R5 Repair, R6 Remanufacture and R7 Recycle.

syake, 2022) showcase how CE practices in both incumbent and startup companies may result in viable business models, the extent and nature of their social impact on workers and communities is not clear. Additionally, by implementing a framework called *SIAF-CE*^{2, 2} (Suarez-Visbal et al., 2022a), (Suarez-Visbal et al., 2022b) asserts that circular jobs tend to emulate persistent structures of the linear TAVC contributing to gender inequality and a lack of workers' participation. Other studies advocate for addressing this gap by incorporating the perspectives of workers into the formulation of CE's social objectives, as well as into the development of programs and policies that will impact them (Suarez-Visbal et al., 2022b), (Ghisellini et al., 2016), (BSR, 2021b), (Padilla-Rivera et al., 2021).

Additionally, authors such as (Rask, 2022) and (International Labour Organisation, 2015) emphasise that a transformative way of rebalancing the social dimension of CE in the sector is done by actively addressing critical gender inequalities. This gendered approach is pivotal given that women are disproportionately present in the most precarious jobs. In this regard, (Interagency Gender Working Group, 2012) developed a gender equality continuum (GEC) that showcases how transformative gender programmes, policies, or processes should look. In the GEC, gender transformative measures seek to redefine women's and men's gender roles and relations to create greater equality. Its interventions target the structural causes and symptoms of gender inequality, leading to lasting changes in people's power and choices over their own lives (Interagency Gender Working Group, 2012). Furthermore, we found four studies that define transformative measures related to the quality of jobs (QOJ), well-being (SL), and gender equality and inclusion (GE&I) (Interagency Gender Working Group, 2012; International Labour Organization, 2017; Beghini et al., 2019; Mao et al., 2019a). Annexe 1 presents a summary of transformative measures mentioned in these studies that can be applied to the TAVC.

2.2. Circular economy futures through a positive desirable lens

The CE future scenarios found in the current literature use mainly predictive or forecasting tools such as top-down scenario planning for their development (e.g. (Börjeson et al., 2006), (Vervoort et al., 2015)). However, this approach is problematic as 'forecasts present a selected past and often-privileged present onto a linear, unidimensional future' (McMichael and Sardar, 2000). Although predictive studies can assess the likelihood of occurrence, traditional future studies can also limit the scope of action as they lack the positive, transformational desirability component (Iwaniec et al., 2021).

Several studies argue that CE present and future narratives are still very narrow in their conceptualisation, with room for conceptual improvement (Geissdoerfer et al., 2017), (Edwards, 2010), (Weigend Rodríguez et al., 2019), (Bauwens et al., 2020). Most CE futures studies are i) asymmetrical, focusing on the techno-environmental dimension and missing the social one (Tham, 2015), (Vaccari and Vanni, 2021), (Bauwens et al., 2020). ii) They lack the inclusion of the most marginalised voices, and iii) they lack a diverse geographical representation (Pauliuk, 2018), (Lacovidou et al., 2020) (Ruiz-Real et al., 2018), (Hobson and Lynch, 2016). As the future is not the same for every society or country (LUHMANN, 1982); there is not one future, but many futures defined by different geographies (Suarez-Visbal et al., 2022a),

² The social impact assessment framework for circular economy (SIAF-CE) dimensions are QOJ (quality of jobs) with three indicators (quality of earning, labour market security and working conditions), SL (sustainable livelihoods) with five indicators (social assets, financial assets, natural assets, human assets, and physical assets), and finally GE&I (gender equality and inclusion) with seven indicators (safe & reliable employment, access and control over economic resources, voice and collective bargain, access to health & security, family planning, free of violence and harassment, equal access to leadership opportunities and training).

(Oomen et al., 2022), (Swyngedouw).

Authors such as (Svenfelt et al., 2019), (Calisto Friant et al., 2020) have already shed light on the need for more alternative visions, although not specifically targeted to the TAVC. Both (Muñoz, 2009) and (Dufva et al., 2017) stressed the need to use co-creation methodologies and diversity in the conceptualisation of CE futures. Within the TAVC literature, other studies have started to engage with CE futures and transition pathways (Buchel et al., 2018), (Vaccari and Vanni, 2021), (LUHMANN, 1982). However, they all lack a social CE conceptualisation and the voices of workers and their representatives. To the authors' knowledge, there are currently no CE future studies that include TAVC alternative visions that are desirable, socially proactive, and co-created with stakeholder and geographic diversity.

A way to study this type of futures is through 'Futuring', a branch of future studies that stresses actors' agency whilst engaging with images of the future to shape possibilities for action in the present (Hoffman et al., 2021). This perspective argues that the dominant dystopian discourse must be challenged by exploring alternative positive visions of different futures (McPhearson et al., 2016). The theory around positive and desirable futures (PDFs) is novel and positions itself as an option to traditional scenarios. Unlike forecasts, PDFs may not be the most likely trajectory but rather the most desirable one (Iwaniec et al., 2021). They are pluralistic and use diverse participatory approaches.

One of the frameworks to study PDFs is the Positive Future Framework (PFF). The framework distinguishes three scenario types – strategic, adaptive, and transformative – as shown in Fig. 2. Strategic scenarios are often technocratic and use a top-down approach, prioritising forecasting. Adaptive scenarios are more qualitative and can involve participants. They use forecast and back-casting techniques, yet the outcomes are still based on extending what is possible. Transformative scenarios (TS) are yet to be explored from the realm of CE futures, let alone for the TAVC. However, they serve well the intention to generate a diversity of CE transformative futures. They prioritise participants' agency and co-develop a vision of desirable futures with stakeholders to identify solutions and pathways linking visions to the current state (backcasting). When developing TS, the focus is placed on who is involved in the framing (composition of group guaranteeing a diversity of voices) and how they are involved. This methodology is deliberately sequenced to encourage critical thinking about transformative change (Iwaniec et al., 2021), (Wolfram, 2016).

2.3. A systems perspective for transformative circular futures

The last angle of our transformative CE lens is the system perspective, a critical aspect for CE, but not applied in CE future studies. This novel approach could steer along more transformative circular scenarios, bringing upfront richer, socially bounded, and equitable

Type of scenario	Strategic	Adaptive	Transformative
Process			
-Approach:			
Top-down	●	●	
Bottom-up		●	●
-Departure point:			
Present	●	●	
Future	●	●	●
-Technique used:			
Forecasting	●		
Backcasting		●	●
World-making			●
Time frame:			
Short term	●		●
Medium term		●	
Long term			●
Content	Closest to the business-as-usual (BAU) approach. Small incremental changes.	Explore outcomes and trade-offs of scenario pathways. Push boundaries of what's possible	Radical departures from status quo and plurality of outcomes
Examples in CE futures literature	[27];[29];[30];[32]	[31]; [35]	NO current literature available

Source: Own elaboration based on [56].

Fig. 2. Types and characteristics of scenarios. Source: Own elaboration based on (Iwaniec et al., 2021).

trajectories (Edwards, 2010), (BSR, 2021b).

One of the main challenges hampering transformation towards CE is the lack of systems thinking and mental model assessment to address complexity (Weigend Rodríguez et al., 2019), (Lacovidou et al., 2020), (Iwaniec et al., 2021), (Bai et al., 2016). A system change approach creates space for collective wisdom and action to emerge, helping to understand the system in which social problems sit and how it changes (Kelly, 1998). Even though there are several ways to study system change and transitions, this study uses the socio-technical perspective and systems thinking approaches of (Meadows, 1999) and (Kania et al., 2018), as they are conceptually easy to apply to businesses and organisations.

According to (Kania et al., 2018) there are six conditions for system change operating at three levels. The six conditions are Resources, Rules-regulations, Roles, Relations, Power dynamics and Mental models (Maani and Cavana, 2007). The levels of system change (see Fig. 3) are Structural, Relational, and Transformational. On the structural level, change happens when rules, regulations, and flow of resources are modified. Relational change is guided by the relations between roles and how power dynamics interact. The relational change level is pivotal for system change as we need suitable structures and proper mechanisms to enable interaction and interrelation. The transformational change is the most profound level of system change. At this level, mental models (also called 'mind shifts' or 'narratives') are more present, affecting how we see the world (Meadows, 1999), (Kania et al., 2018). Mental models can explain how we make decisions, behave, and selectively filter and interpret information. They can also be elicited in a group setting to create a shared vision for how people would like to experience or change a system. Concurring with this theory, shifts in system conditions are more likely to happen when working at all three system-change levels (Kania et al., 2018).

2.4. Theoretical framework

Fig. 3 illustrates our theoretical framework building up on Fig. 1, where a transformative CE lens connects positive desirable futures methodologies, social impacts with a gender perspective, and system change. This transformation lens is essential for this research, as it focuses on the who frames change narratives and, on the effects that these changes have on workers and communities. It aspires to reconfigure social-ecological systems towards more 'desirable' futures, in this case, more desirable CE futures. This connection allows us to envision alternative futures of a TAVC that embraces circular strategies while incorporating systemically social aspects that have been neglected so far.

The left side of Fig. 3 shows the gender transformative social impacts influencing the TAVC according to (Suarez-Visbal et al., 2022a): quality of jobs (QOJ), well-being, and gender equality (GEI). The positive desirable futures (PDFs) (Iwaniec et al., 2021) (in the bottom-centre of Fig. 3) define transformative scenarios as scenarios that are co-created by diverse stakeholders to produce desired alternative CE futures. The right side of the figure portrays how system change happens and how it is sustained. According to (Kania et al., 2018), systemic change is produced when six conditions interact at three levels. At the deepest level (transformational) a shift happens in our set of values, beliefs, and patterns of social behaviour. A transformative CE transition depicted in green in the centre of Fig. 3, is the converge point of a CE that embraces socio-gender considerations and uses a system-change approach in the elaboration of transformative scenarios.

3. Method

This study adopts a participatory action research (PAR) approach, to co-create transformative circular future scenarios (TCFs). PAR prioritises the value of experiential knowledge for tackling problems caused by unequal social systems, envisioning and implementing alternatives [(Cornish et al., 2023), p. 1]. This research consists of two phases:

scenario co-development and scenario analysis. These phases include the steps indicated in Fig. 4.

3.1. Sample

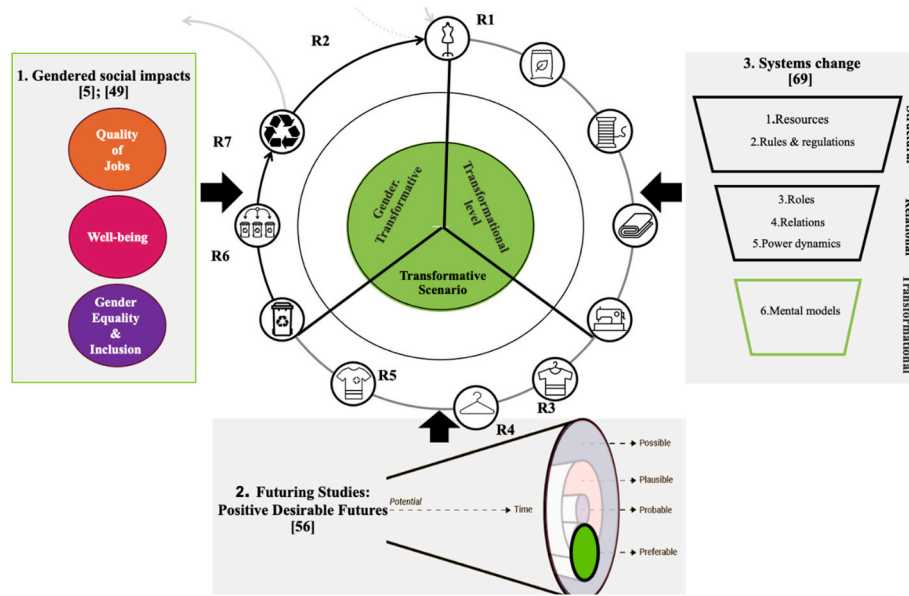
To co-create the TCFs, an inclusive group of stakeholders was selected using the snowball referral method, encompassing senior and entry-level staff in diverse types and sizes of companies, ensuring a heterogeneous sample. The sample includes academics, labour representatives, policymakers, industry experts, and both senior and junior employees of pioneer start-ups, and established businesses involved in circular strategies in the Netherlands, Spain, and India. The Netherlands is chosen due to its leadership in CE implementation in textiles with a goal to achieve 100% circularity by 2050 (Ministry of Infrastructure and Water, 2020). Spain is a major regional exporter of recycled textiles and clothing to other European countries (Carrera and Casas, 2019). India is a hub for raw materials, textiles, and garment manufacturing, with a flourishing circularity culture (Laudes Foundation and BSR, 2020), (Kotamaraju et al., 2021).

3.2. Scenario co-development

In this phase, we used visioning as a first step to prepare the co-creation of scenarios. Visioning refers to the process of creating a statement about what people aspire to be or to accomplish in the future (Jackson, 2013). To avoid power dynamics between senior management and entry-level staff, we had two visioning sessions tailored for them. Senior management staff wrote 'Letters of the Future' (LOFs) (Sools et al., 2015) envisioning a circular apparel and textile value chain in 2050. LOFs are a narrative account that helps to understand internal motivation and desirability aspects in how people construct visions of their world. A total of 80 letters were analysed using six futures or visions characteristics as coding themes. These characteristics were inspired by (Suarez-Visbal et al., 2022a), (Iwaniec, 2013), (Candy and Watson, 2015) and include: i) future direction (grow, decline, transform); ii) government roles (weak, strong); iii) technology; iv) localisation (local-global or glocal-a combination of both; v) sustainability (circular strategies); vi) societal relevance (social impacts) as seen in Table 1. The use of these characteristics allows the establishment of a base for comparisons and an understanding of what are the most critical aspects when defining future visions.

Entry-level staff created a visioning board inspired by (Jackson, 2013). They imagined being in 2050 and were asked questions to describe their surroundings, situation, and companionship. They were asked to fill in the icons on the individual narrative board from the thing of the future activity (Candy and Watson, 2015), resulting in 15 future narratives analysed in conjunction with the LOFs. Participants' visioning and LOFs narratives received a code to anonymise them. The first letter refers to the country, followed by the participant number.

During the second step of scenario development, two workshop sessions were held in each country. These workshops included 24 participants in the Netherlands, 33 in Spain, and 35 in India, divided into senior management and entry-level staff workshops. An interactive online whiteboard facilitated information collection. In the first workshop the LOFs and the visioning narratives of workers were used as a departure point of inspiration for the first workshops, which resulted in the first draft of 16 TCFs with narratives and visual representations of an inclusive circular industry in 2050. The co-created scenarios were based



Source: Own elaboration.

Fig. 3. Conceptual framework, based on a transformative lens connecting circular future studies, social impacts with a gender perspective and system change. Source: Own elaboration.

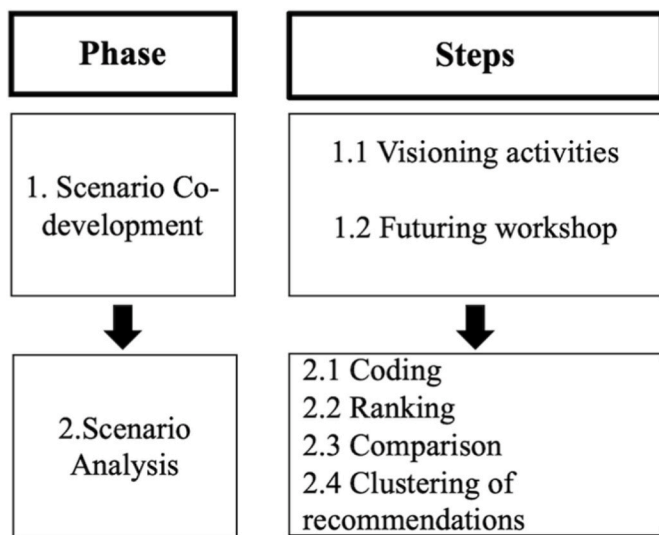


Fig. 4. Research phases.

on the activity of the thing of the future³ (Candy and Watson, 2015). In the second workshop, participants listened to a worker’s persona⁴ audio. Afterwards, they discussed how this worker’s life would be impacted if the group’s TCF created in the first workshop was implemented in 2050. This discussion led to an adjusted TCF. The elaboration of the final version of the TCF was completed by employing a backcasting exercise. Backcasting was chosen because it helps envision what needs to be prioritised sequentially to achieve a desirable outcome (van den Ende et al., 2021). Participants were asked to think of barriers and

³ Which consisted of having people pick four cards (an action/thing card, a future arc card, a stakeholder card, and a social impact domain card). With these four cards, they created their narrative for an inclusive circular industry in 2050.

⁴ A semi-fictional worker whose characteristics were recorded based on previous research by (Suarez-Visbal et al., 2022b).

levers at three different stages in time: long term (from 2040 to 2050 years); medium term (between 2030 and 2040 years); and short term (from the present up to 2030). The backcasting exercise together with the recommendations on how to overcome the barriers they envisioned constituted the elements of the final 16 TCFs.

3.3. Scenario analysis

The data analysis for future scenarios followed a four-step process using the Positive Future Framework (PFF) as stated by (Iwaniec et al., 2021), which is well suited for comparative analyses. The four steps included: coding, ranking, comparing and recommendations clustering. Initially, thematic coding and clustering were performed using Table 2.

Inspired by the Gender Continuum from (Interagency Gender Working Group, 2012), Table 2 links the three axis of CE transformation (social, system and scenario), and establishes a colour-coded ranking going from ‘not responsive-structural-strategic’ in red, to ‘adaptive-relational responsive’ in yellow and ‘transformative’ in green. The ranking was based on the description of (Interagency Gender Working Group, 2012), (Kania et al., 2018), (Iwaniec, 2013). The rows show the types of transformation: social dimension with a gender lens in the first row, system-change conditions in the second row, and future visioning characteristics in the third. The columns show the different levels of transformation. After the thematic coding was completed, ranking was performed. Results were plotted on a system vs scenario matrix.

The third step involved two comparisons. The first comparison was a ‘within-country’ comparison where TCFs within a single country were compared based on their initial coding. The second comparison was a cross-country comparison aimed at identifying commonalities and differences in social impacts, gender-inclusion gains, and system changes.

The final step consisted in grouping the recommendations that originated in the backcasting activities of the TCFs. They were grouped according to the level and type of transformation described in Table 2. Five CE experts in each country validated the recommendations.

3.4. Reliability and validity

We incorporated the strategies proposed by (Morse et al., 2002) to ensure the robustness, validity, and reliability of this qualitative research. To enhance validity, we: (1) used peer debriefing to uncover

Table 2
Scenario and system transformation levels.

1. Level of gender transformation	Gender negative – gender blind	Gender-sensitive	Gender-responsive	Gender-transformative
Social impact looked through a gender lens as per the gender equality continuum (Interagency Gender Working Group, 2012)	The scenario has a negative outcome that aggravates or reinforces existing gender inequalities and norms or that maintains the status quo and will not help transform the unequal structure of gender relations.	This recognises existing differences and challenges, but with a low-hanging fruit approach	This considers social dimensions and gender inequalities and responds proactively to overcome and eliminate such inequalities	This attempts to redefine women’s and men’s gender roles and relations to create greater equality. Its interventions seek to target the structural causes and symptoms of gender inequality, leading to lasting changes in the power and choices women (and men) have over their own lives
2. Level of system transformation		Structural change level	Relational change level	Transformative change level
The scenario has system-change conditions at different levels from structural, relational, or transformational (Kania et al., 2018)	N/A	The scenario has rules, regulations, and process conditions	The scenario has roles, relations, and power relations conditions	The scenario also has mental model conditions
3. Level of scenario transformation		Strategic	Adaptive	Transformative
Visioning characteristics: i) Future direction (growth, decline, transform), ii) Government roles (weak, strong), iii) technology, iv) Territoriality (local-global or glocal – a combination of both v) Sustainability (circular Strategies R1–7), vi) Societal relevance (social impacts as seen in Table 1). (Suarez-Visbal et al., 2022a), (Iwaniec, 2013), (Candy and Watson, 2015)	N/A	This covers a few visioning characteristics. (less than three)	This covers most of the visioning characteristics (three or more)	This covers all six characteristics

Source: Own elaboration inspired by the traffic-light gender equality continuum tool of ([Interagency Gender Working Group, 2012](#)).

it has been possible to guarantee a basic salary to any citizen from 18 years old who is working or not’ or as (S5) said, ‘Today all manufacturing is circular by regulation and all these manufacturing processes are audited’. Even though senior managers and experts emphasise QOJ, entry-level worker’s GEI are the most important social impacts. As (S2) worker said: ‘We now have a different type of contract, more flexible and based on win-win and trust’.

4.1.3. India

Indian individual narratives of the future are portrayed by participants as transformational, with an influential role played by the government focusing on a global perspective and relying on high-tech. The most relevant CS are Recycle (R7), Reduction (R2), and Remanufacture (R6), as seen in [Fig. 5](#). All three dimensions of social impact (QOJ, SL, and GEI) are relevant. As [I10] said, ‘companies have invested not only in technologies but in their human resource by providing relevant training to the people involved’.

The narratives go from inclusive growth powered by technology, with artisans and informal workers having full access to technology, to growth-limiting narratives. One vision highlights how in 2050, there are apparel factories worldwide producing very little quantity with very high qualities [I3]. They employ few workers, but they are paid well. The industry is producing 100% recycled garments, representing one-third of the garments of 2021’. Alternatively, (I23) brings the power of sharing and Rental to transform how businesses function: ‘The brands’ business models have evolved, and everything is offered as a service now. We are not producing a crazy number of garments anymore’.

4.2. Transformative circular futures (TCFs)

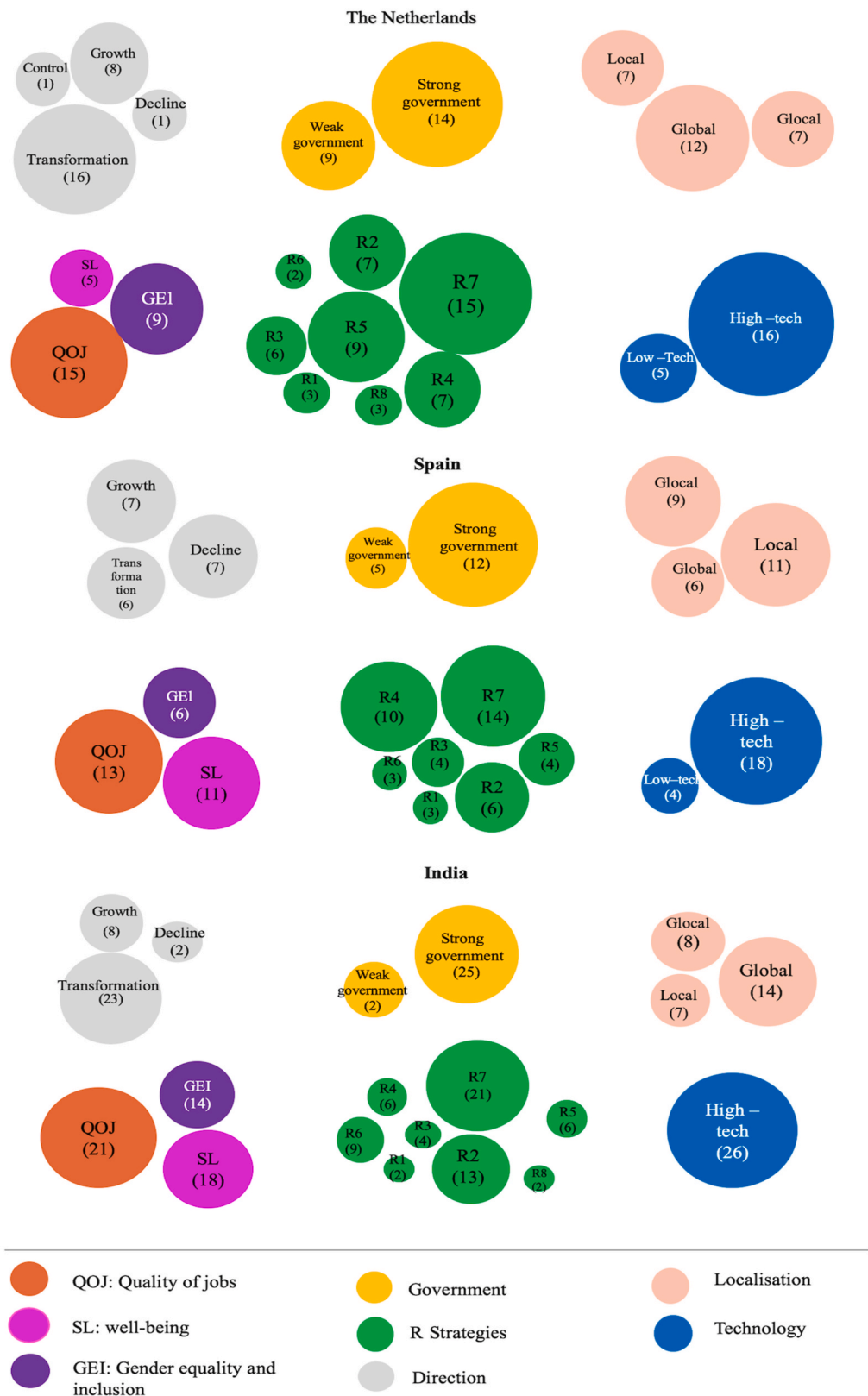
TCFs were co-created to represent CE visions of the TAVC that are

diverse, systemic, and embedded with consideration for social impact. [Table 3](#) includes a summary of the concepts used in all 16 TCFs developed according to the above-mentioned visioning characteristics ([Table 1](#)). The rows show the TCFs organised by country, and the columns show the relevance of each characteristic, where big dots indicate high relevance and small dots minor relevance (i.e., mentioned only once). The absence of a dot indicates that the scenario does not have this characteristic. The shadowed columns highlight the common concepts among TCFs.

4.2.1. Dutch TCFs

In the Netherlands, four TCFs were co-developed. The comprehensive descriptions for each TCF are included in [Annexe 2](#). As seen in [Table 3](#), all Dutch TCFs focus on textile waste Recycling technology and Repair. With regard to localisation, TCFs are either local or glocal. All scenarios are high-tech-oriented, where robots and automation play a relevant role by taking away the ‘worst’ part of circular jobs, such as hard sorting, and by giving room for reskilling, better opportunities, and better pay. Additionally, communities play a pivotal role as drivers of circularity.

Regarding social impacts, some GEI elements are prominent, such as living wages and the creation of flexible types of employment contracts favouring shorter working weeks (3–4 days). They also privilege more family time and well-being. Additionally, they share lifelong professional training and reskilling based on personal growth and career advancement. The most relevant differences relate to the tensions and gaps between the different standards of education and the value of different professions, such as repair and design. About half of the TCFs advocated stronger relations between education and employment to cope with these tensions and more synergy between social businesses and academia.



Source: Own elaboration.

Fig. 5. Visioning characteristics found in the LOFs regarding future direction, government role, technology role, territoriality, circular strategies prioritisation, and social impact dimensions. The size of the bubble corresponds to the number of times each concept was mentioned. Source: Own elaboration.

Table 3

Relevant concepts of TCFs in the three countries based on the thematic code using the six characteristics of future vision. The shaded areas show the most common concepts by most TCFs in all countries (lighter grey) or in one country (darker grey).

1. Direction of future	2. Role of government	3. Role of technology	4. Localisation	5. Circular strategies prioritised	6. The social dimension prioritised by SIAF-CE		
Transform	Weak	Low-tech	Local	R1 Redesign R2 Reduce/use recovered material. R3 Rent R4 Resale R5 Repair R6 Remanufacture R7 Recycle	Quality of job	Well-being	Gender equality & inclusion
Growth			Glocal				
Decline (degrowth)	Strong	High-tech	Global				
Control-BAU							

Source: own elaboration based on [5], [80], [81].

4.2.2. Spanish TCFs

For Spain’s TCFs, the government plays a significant role, followed by companies, and then communities. They all focus on a hyper-local vision, with minimal consideration for the global aspect of the TAVC. All futures are high-tech, and most CS seem to concentrate on Recycle and Rental, although other CS are also mentioned (see Table 3). Robotics and automation were mentioned by four of the TCFs, leading to fewer jobs, with higher technical skills and better pay, and a stronger social security system financed partially by robots’ taxation on the sector.

Half of the TCFs see a transformational direction, while the other half is split between a growth and degrowth future direction. One group sees transformation as a direct result of our current linear model based on moderated green growth. The second group is based on degrowth, with inclusive and circular narratives around a self-consumption economy where only surpluses are marketed or processed industrially. The community shares resources management with strong principles of co-responsibility, with new forms of production creating better labour relations.

Regarding social impact, there are, on the one side, very progressive and gender transformational features, such as a diversity-of-origin integration policy (to increase diversity and inclusion), focused on physical and emotional well-being, with redistributive retirement and child co-sharing responsibilities. On the other side, there are very strategic measures, with generic rules such as favouring gender equality when subsidising and appraising. Reskilling and training are also relevant in four of the cases while living wage is only mentioned twice, and a decent, fair, and commensurate salary appears in four TCFs.

4.2.3. Indian TCFs

In India, four out of the six TCFs have a local focus, and five have a glocal one (none has a global focus). The most relevant CS are Recycle and Repair, while only one scenario considers Reduction. Social impacts show some similarities among TCFs such as the improvement of the social security system, the provision of universal health for all workers, the strengthening of workers’ collective bargaining, informal working recognition, reskilling in digitalisation and circularity, and rights-based contracts with fixed working hours.

All TCFs emphasise well-being and more leisure time. In terms of roles, communities, governments, and companies have critical roles in inclusive circular transformations. Half of the scenarios came up with new roles, such as the ministry of ‘gamEducation’ (education through gamification), the Ministry of Refugees, or the convener bridging the gap between stakeholders. In contrast, instead of adding new roles, the other half emphasised strengthening the relationship through education or through orchestrated production systems with managing entities

called DAOs (decentralised autonomous organisations).

4.3. Comparison between countries

Fig. 6 shows a comparison of all developed TCFs in each country according to their level of system change (structural, relational, transformative) and their gender scenario transformation level (negative/blind, sensitive/strategic, responsive/adaptive, and transformative). The horizontal axis represents the extent of the measures considering social and gender transformation, while the vertical axis represents the system change depth of each TCF. The TCFs included in the green lower-right corner represent the most transformational features from both perspectives. In this light, India has the most TCFs in the transformative quadrant intersecting gender-transformative scenarios and system change transformation. This can be explained by the fact that India bears strong power dynamics from brands to suppliers and suppliers to workers. As India deals with both manufacturing and recycling phases where the most vulnerable positions are for suppliers and workers, they are positioned to win with more alternative, desirable futures. This shows that for genuinely inclusive transformative circular futures, the voice of all stakeholders along the value chain should be heard. Without their voices and views, any circular, inclusive future transition will fall short in its transformative ambition.

Indian TCFs also focused on new roles and relations to safeguard a specific interest group, level power dynamics, and address existing tensions. This highlights the need to develop mechanisms to manage power imbalances, which is also part of the inclusion lens. Finally, at the transformational level of change, additional narratives related to refocusing on values such as respect, tolerance, community knowledge, and valorisation of professions are present. Other TCFs also have narratives related to universal design principles, access, and democracy, removing patriarchy as values to redefine rules, regulations, and use of resources. This shows the need to alter our value system concerning people and businesses to avoid patchwork solutions that create temporary fixes in the ‘now’ while creating problems in the future.

Spanish TCFs had the most gender transformative features (from the social impacts perspective), with rules, regulations, and resources designed to break patriarchy by making mandatory the redistribution of wealth and policies to reduce the gender pay gap and gender inequality. However, they also have two contrasting outliers. In these two groups, the labour representatives’ participants were not present, which indicates that diversity and social inclusion voices are critical for more transformative solutions.

At the relational level, Spanish TCFs focused on new roles and relations to safeguard a specific interest group, level power dynamics, and

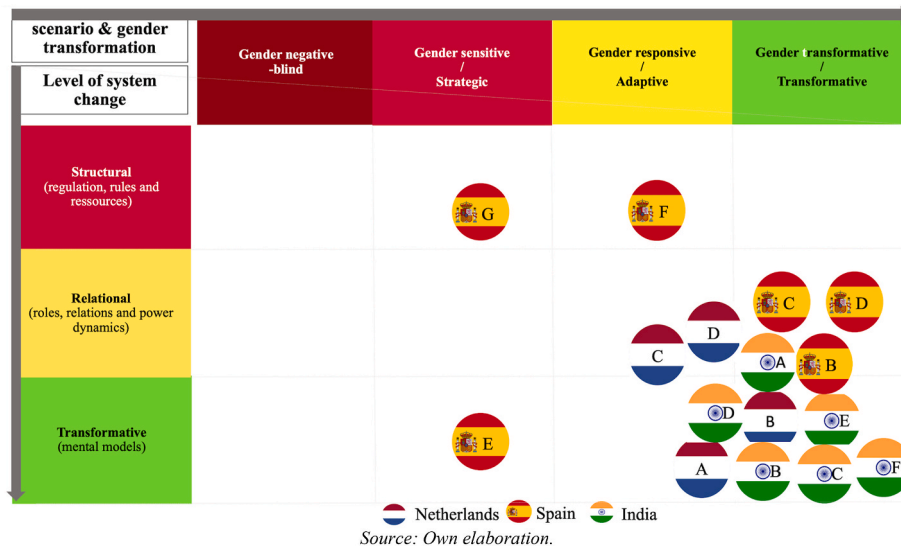


Fig. 6. Scenario-system matrix: Columns show the level of system change, and the rows show the level of transformation of scenarios. Source: Own elaboration.

address existing tensions. Other TCFs speak of strengthening existing relations rather than creating new roles. At the transformational level change, only one TCF had concrete mental model changes and talked about balancing the asymmetry of environmental and social impacts of businesses.

Finally, most Dutch TCFs are at the gender responsive level, where only two TCFs present critical gender transformational elements, such as the gender pay gap and parity in childcare. Also, only half of the TCFs mentioned migrants/refugees and gender gap reduction, two critical aspects of gender inclusion transformation. Regarding system change, most Dutch TCFs are mainly rich in structural and relational level changes, but modest on a transformational level. Only one TCF recognises that power imbalances will be reaffirmed with more substantial globally operating tech/data companies mainly based in the global north. Mental models from both LOFs and TCFs point to integrating

social and environmental considerations into the business model, towards more people-centric models.

4.4. Recommendations for businesses and policymakers

The recommendations resulted from the backcasting and further grouping and validations. They were made on the following topics: QOJ, well-being, GEI, and enablers for an inclusive circular textile system. The recommendations were targeted to either businesses or policymakers. Fig. 7 shows the most transformational recommendations for each country and stakeholder. A complete list of detailed recommendations is presented in Annex 3.

As seen in Fig. 7 recommendations for businesses in The Netherlands regarding QOJ focus on guaranteeing living wages for all workers of the TAVC. In terms of well-being, they aim at reduced working schedules

Type of Recom.	Quality of Jobs	Well-being	GE&I	Enabling the system for inclusive CE	The Netherlands	Spain	India
Businesses Recommendations	Guarantee living wages* for all workers of the value chain, including subcontracts				●	●	●
	Phase-out the "pay per piece" system with subcontractors				●		●
	Updating contracts to be rights-based including access to medical facilities and provident funds for all workers, right to access technology and digital training for segregation platforms						●
	Offer flexible weeks and reduced schedules from 4 or 3 days while keeping living wages				●	●	
	Eliminate gender payment gaps for the same job and requirement levels across value chain				●	●	●
	Offer labour contracts including well-being and care as rights					●	●
Policymakers Recommendations	Make living wages mandatory for all businesses part of value chain				●	●	●
	Regulations requiring companies to spend a percentage of their profit in workers reskilling and training for circular transition					●	●
	Revise the immigration policy to consider immigrants' and refugees' integration AND prosperity					●	●
	Regulation to guarantee equal maternity and paternity leave				●	●	
	Require all size businesses across TAVC to eliminate gender income disparity				●	●	●
	2.0 inclusive-global circular economy policy road map for the sector that ensure universal health care for all workers, whether registered or informal				●	●	●
	Create EPR with internalised cost of waste management across borders (global accountability fees)				●		●
	Create an automation and robotisation tax that is used to fund inclusive circular transition programmes.					●	●
	Provide tax-credits to businesses with circular jobs (repair, rental, resale, remanufacture & recycling)				●	●	●
	Legislations to require business to internalise social and environmental externalities by reporting a triple bottom line for fiscal purposes				●	●	●
Regulation that reduces taxes on labour and increase taxes on unsustainable resources				●	●		

Source: Own elaboration.

Fig. 7. Summary of transformational recommendations in the three countries under study. Source: Own elaboration.

(3–4 days) without payment reduction, freeing workers' time to invest in their personal growth, training for collective bargaining, and family and community time. In terms of GEI, they propose the elimination of the gender pay gap for the same job with similar requirements.

As for policymakers, (see Fig. 7) the most relevant recommendations address mandatory living wages, the establishment of an upper cap on top-leaders' salaries, and salary redistribution to reduce income disparity. Regarding GEI, recommendations include revision of immigration policies to consider not only immigrants' and refugees' integration but also their prosperity and their right to thrive. Additionally, they require the elimination of gender income disparity in companies of all sizes. Inclusive circular enablers include tax credits for businesses with staff dedicated to circular jobs, extended producer responsibility (EPR) with global accountability fees, and tax reduction on labour.

In Spain, business recommendations align with those in the Netherlands. However, they are more gender transformational as they seek to break further the patriarchy ingrained in the TAVC. Recommendations include new labour contracts considering well-being and care as rights, and incentivising co-responsible parental leave. In addition to those mentioned in the Netherlands, policymakers' recommendations regarding GEI include a mandatory 'saving for retirement' fund scheme (co-funded by employer, employee, and government, with special provisions for female workers). Regarding inclusive circular enablers, they propose regulations that require companies to spend a percentage of their profit on reskilling and training for the circular transition.

Finally, in India, recommendations are the most transformational. Regarding QOJ, they focus on revising and updating contracts to be rights-based, including access to medical facilities, pension funds for all workers, and the right to training and access to digital sorting for both formal and informal workers, which is a radical departure from today.

With regard to policymakers, the recommendations include the establishment of a 2.0 inclusive-CE policy roadmap for the sector. This should be done by establishing a task force including informal workers and representatives to assist in the transition to the formalisation of recyclers and waste pickers. The task force should guarantee a minimum number of hours worked that provides at least a minimum wage. Additionally, for other workers, this road map must ensure reskilling programmes for Repair, Recycling, and upcycling to ensure a fair circular transition for workers. Additionally, it should also ensure universal health care for all registered or informal workers. Regarding GEI, recommendations include support for businesses that provide on-site day-care facilities and support the creation of external daycare facilities via government subsidies.

5. Discussion, limitations, and future research

5.1. Discussion

All TCFs showed a combination of social impact gender equality measures ranging from adaptive to transformational, which constitute a rich argumentation for policy and business recommendations to be implemented in the short, medium, and long term. These results agree with the findings of (International Labour Organisation, 2015) and (Gupta, 2000) that state that the melding of social impacts and gender consideration can offer perspectives to rebalance the social dimension of CE. Also, this study shows how co-production methodologies, systems thinking, and future studies can produce a diversity of futures, aligning with the findings and considerations of (Iwaniec et al., 2021), (Hoffman et al., 2021; McPhearson et al., 2016; Ogilvy, 2002).

Addressing a noted gap in geographical diversity by (Oomen et al., 2022), this study included perspectives from the global south in addition to the European one. This broader representation is critical to the discourse surrounding CE futures, ensuring a more comprehensive and inclusive global perspective.

The process of co-creating TCFs highlighted the importance of

privileging the agency of a diverse set of participants. Collaborating with various stakeholders exposed tensions, which were acknowledged and considered in the TCFs. This iterative process, which transitioned from individual exercises (LOFs) to collective efforts, deliberately aimed to incorporate rarely heard voices and recognise power dynamics. As a result, more comprehensive, structured, and inclusive recommendations emerged. This outcome is crucial for the TAVC, as a global perspective informed by diverse stakeholder experiences mitigates geographical blind spots and minimises trade-offs in CE policy-making and implementation.

This study responds to calls from (Weigend Rodríguez et al., 2019), (Calisto Friant et al., 2020), (Hamstead et al.) to meld system perspectives in the co-creation of CE futures studies. By incorporating a transversal gender-equality lens, it contributes to the development of more holistic, systemic, and socially rich alternatives for the TAVC. These alternatives offer a pathway towards more inclusive and circular CE futures.

Positive and desirable features were evident in all TCFs, but their positivity did not necessarily imply optimism. Several TCFs contained tensions, chaos, and dichotomies, serving as critical elements that unveiled blind spots and facilitated the understanding of how to manage these tensions. These elements also aided in the development of anticipatory capacity among stakeholders in the TAVC, which was also mentioned by (Iwaniec et al., 2021), (McPhearson et al., 2016) as a necessary step in the transition to a CE, as learning to deal with uncertainties about the future helps us to cope better with tensions.

An intended outcome of this research was to infuse social features into CE future narratives via co-creation with a diverse group of stakeholders (in terms of geography, gender, and roles within the TAVC). Two critical findings emerged from this process. Firstly, the social aspect of CE may not naturally surface but must be explicitly addressed as a goal. Secondly, the full participation of social-impact-driven stakeholders, including workers, labour unions, and social NGOs, proved essential for enhancing the social richness of the TCFs. This underscores the importance of recognising implicit power dynamics in the negotiation process, emphasizing the need for continuous stakeholder involvement in CE policymaking and business negotiations, which has also been corroborated by (Interagency Gender Working Group, 2012; International Labour Organization, 2017; Beghini et al., 2019), (Mao et al., 2019b).

Additionally, four areas of tension in the development of transformative circular futures were found: first, none of the TCFs has a 100% global focus, which is a radical departure from today, considering that the current TAVC is highly globalised. Most Indian TCFs perceived the India of 2050 as a global production hub and a thriving consumer of local circular strategies. In Spanish and Dutch TCFs, some level of reshoring of activities and creation of local jobs is present. In contrast, others speak of a new 'glocalisation', with extreme localisation coexisting with global activity, with evident power divides. This points towards a desire for closer-to-home circular systems, which will mean a complete redefinition of how the TAVCs currently operate.

Second, there is evident tension around growth and degrowth narratives, which is a necessary conversation currently emerging in the CE debates, as indicated by (Svenfelt et al., 2019), (Calisto Friant et al., 2020). In all three countries, in LOFs and TCFs, we found implicit examples that mention the limits to growth, if not explicitly degrowth per se. Half of Spain's TCFs, one Dutch and one Indian TCF considering some degrowth degree and half of the TCFs going for green growth. For example, some Spanish TCFs indicate a self-consumption economy with strong principles of co-responsibility as new forms of production, bringing more well-being, and indicating that a shift towards more collective ownership could improve inclusiveness. Other Spanish and Dutch TCFs speak about a dematerialised fashion market based on trading consumer experiences in virtual reality, not physical products. In comparison, some Spanish LOFs and Indian TCFs propose regulating a limited number of versatile regenerative certified materials, while others indicate a ban on new clothing production. These narratives

propose a CE based on limited resource capacities and a vision of reducing production.

Third, there is a technology-automation tension related to circular jobs. While no TCF mentions low-tech, the LOFs and visioning activities of workers indicate a desire for a low-tech future that brings value to craftsmanship. Some TCFs see automation as freeing workers from the worst part of their jobs, and some see it as a cause for job losses from the most vulnerable workers. In contrast, others see technology for recyclers as an enabler for better lives and a tool to reduce inequalities. Some TCFs resolve this tension by investing in reskilling labour-intensive and high-skills circular strategies, such as Repair and Remanufacture, combined with a more high-tech recycling sector.

Fourth, the diversity of voices involved in the co-production process of the TCFs indicated both tension and mutual understanding of concepts, such as gender equality, transformation, or even living wages. These concepts are often nuanced by self-interpretation that is bound to cultural and social aspects. For instance, around living wages, adjectives such as 'fair' or 'decent' salary were often used in Spanish and Indian contexts, while Dutch TCFs talked mainly about living wages for workers across borders. In India, even some stakeholders called for decent salaries for informal workers while proposing living wages for factory workers.

This highlights power dynamics present in the mental models of some TCFs. In this regard, a cross-border understanding of living wages, inclusion, and gender equality and adherence to this as a principle seems inevitable on the road to a more just and transformative circular transition.

5.2. Limitations

Co-creation and diversity were prioritised in this research to increase inclusivity in the TAVC. However, such an approach is also prone to a certain degree of misinterpretation, since concepts such as gender equality, transformation, and even CE may have different meanings in different geographical and cultural contexts. Nevertheless, this risk was minimised by employing local translators and research assistants to clarify concepts and align definitions used in the research. Additionally, even though a diversity of voices from different stakeholders in the TAVC was sought, not all stakeholders participated, and some of those who participated did not participate in all the stages of the research, which means that we could have missed relevant voices, which would have enriched the discussion.

Finally, due to COVID restrictions, most vulnerable workers were not so easy to address, and it was not easy to interact with them, which might have limited the richness of their contributions.

5.3. Future research

Future research could focus on the operationalisation of the recommendations of this research by different businesses involved with circular practices in the TAVC. It would be helpful to see how these recommendations translate into practice and how corporate systems are hindered or motivated to act upon them. This piloting should ideally be done in various companies with diverse geographical representation.

With regard to CE futures in general, future research could focus on incorporating the vision of other stakeholders, such as consumers. As geographical diversity is still considered a gap in CE and CE future studies, it is worth including other countries from the global south and comparing such results to what has been done so far. As this research focuses on CE futures in the TAVC, focusing on other industries and contrasting findings would be helpful in validating the futuring approach presented in this study.

6. Conclusions, contributions, and implications

This manuscript advocates a socially inclusive approach for co-

producing TCFs in the field of CE. Incorporating gender equality, stakeholder diversity, and social impacts is crucial for developing recommendations guiding the transition to a holistic, systemic, and socially rich CE. These principles should be prioritised in CE policymaking and business implementation to ensure comprehensive stakeholder involvement.

To address our research question, we explored conceptual and methodological aspects. Conceptually, the use of TCFs introduces diversity into defining desirable social impacts such as QOJ, well-being, and GEL. As a result, TCFs provide CE recommendations for the TAVC that are socially rich. According to our results, Dutch TCFs emphasise living wages and flexible work arrangements, while Spanish TCFs focus on eliminating gender pay gaps. Indian TCFs prioritise universal health coverage, collective worker bargaining, informal labour recognition, and reskilling. A common concept is establishing a global committee of social actors to ensure social considerations in CE implementation processes, regulation, and resources.

Additionally, four critical conceptual tensions emerged: (1) a nuanced tension between 'glocal' visions and local circular systems, (2) we see visions of reduced production imposing a limit on growth within European TCFs that contrast with the absence of such aspects in Indian TCFs, (3) different levels of technology access and reskilling that contrast with craftsmanship, and (4) the need for a cross-border harmonised definition of living wages. These tensions underscore the need to incorporate global south-based partners' perspectives into the global transformative CE roadmap, aiming at a more just circular transition.

Methodologically, a participatory approach was employed, promoting diversity in geography, gender, worker type, and stakeholder involvement. TCFs emerged as co-created CE visions in the TAVC, diverse, systemic, and socially impactful. Future efforts should ensure the participation of social stakeholders including workers, labour unions, and social NGOs in CE policy and industry negotiations at local, national, and international levels.

At a practical level, this research provides recommendations for businesses and policy makers aiming to redress the imbalance between social and environmental dimensions and challenging the patriarchal system. These recommendations shed light on the importance of developing harmonised policy roadmaps that include both European and non-European considerations.

Combining desirable futures, social transformation, and systems thinking, this research contributes to the CE and the CE future literature by emphasizing social inclusivity and 'glocal' perspectives. 'Glocal' perspectives nuances should be introduced into CE future discussions, recognising the need for both localised and globally interconnected circular systems. Practitioners can use this research results to integrate social considerations in CE strategies, tailoring approaches to regions, promoting gender equality, embracing systemic change, and adopting participatory methods. Additionally, futuring techniques and gender transformative measures, along with systems thinking, offer valuable tools for scenario planning. TCFs provide a comprehensive understanding of the social implications of CE practices, fostering environmentally sustainable and socially equitable CE practices.

The authors hope that visualizing more inclusive and transformative futures, including workers' and communities' perspectives, helps rebalance the asymmetry between environmental and social considerations in the conceptualisation of CE within the textile and apparel value chain.

Availability of data and materials

The data are available upon request to the corresponding author on reasonable request.

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CRedit authorship contribution statement

Lis J. Suarez-Visbal: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Jesús Rosales-Carreón:** Writing – review & editing, Supervision, Methodology. **Blanca Corona:** Writing – review & editing, Methodology. **Jesse Hoffman:** Writing – review & editing, Methodology. **Ernst Worrell:** Writing – review & editing.

Declaration of competing interest

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Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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References

- Alcamo, J., Henrichs, T., 2008. Chapter two towards guidelines for environmental scenario analysis. In: *Environmental Futures: the Practice of Environmental Scenario Analysis*. Elsevier B.V., pp. 13–35.
- Andersson, J., 2018. *The Future of the World: Futurology, Futurists, and the Struggle for the Post Cold War Imagination*. Oxford Univ. Press.
- Ascoly, N., 2009. *The Global Garment Industry and the Informal Economy: Critical Issues for Labour Rights Advocates*. Clean Clothes Campaign.
- Bai, X., et al., 2016. Defining and advancing a systems approach for sustainable cities. *Curr. Opin. Environ. Sustain.* 23, 69–78. <https://doi.org/10.1016/j.cosust.2016.11.010>.
- Battesini Teixeira, T.G., de Medeiros, J.F., Kolling, C., Duarte Ribeiro, J.L., Morea, D., 2023. Redesign in the textile industry: proposal of a methodology for the insertion of circular thinking in product development processes. *J. Clean. Prod.* 397 (136588), 136588 <https://doi.org/10.1016/j.jclepro.2023.136588>.
- Bauwens, T., Hekkert, M., Kirchherr, J., 2020. Circular futures: what will they look like? *Ecol. Econ.* 175, 106703 <https://doi.org/10.1016/j.ecolecon.2020.106703>.
- Beghini, V., Cattaneo, U., Pozzan, E., Schlanbusch, D., 2019. *A Quantum Leap for Gender Equality: for a Better Future of Work for All*.
- Börjeson, L., Höjer, M., Dreborg, K.-H., Ekvall, T., Finnveden, G., 2006. Scenario types and techniques: towards a user's guide. *Futures* 38 (7), 723–739. <https://doi.org/10.1016/j.futures.2005.12.002>.
- BSR, 2021a. *Keeping Workers in the Loop: towards an Inclusive & Regenerative Fashion System*.
- BSR, 2021b. *Circular Fashion: Exploring the Job Impacts and Challenges in Fashion's New Paradigm*.
- Buchel, S., Roorda, C., Schipper, K., Loorbach, D., 2018. no. *The Transition to Good Fashion* [Online]. Available: https://drift.eur.nl/wp-content/uploads/2018/11/FINAL_report.pdf.
- Calisto Friant, M., Vermeulen, W.J.V., Salomone, R., 2020. A typology of circular economy discourses: navigating the diverse visions of a contested paradigm. *Resour. Conserv. Recycl.* 161, 104917 <https://doi.org/10.1016/j.resconrec.2020.104917>.
- Candy, S., Dunagan, J., 2017. Designing an experiential scenario: the people who vanished. *Futures* 86, 136–153. <https://doi.org/10.1016/j.futures.2016.05.006>.
- Candy, S., Watson, J., 2015. *THE THING FROM THE FUTURE*. Situation Lab.
- Carrera, E.Y., Casas, X., 2019. Challenges and Opportunities of Textile Recycling [Online]. Available: <https://www.upc.edu/intexter/ca/jornada-industria-textil-sost-enibilidad/documentos>. (Accessed 30 July 2022).
- Cornish, F., et al., 2023. Participatory action research. *Nat. Rev. Methods Prim.* 3 (1), 34. <https://doi.org/10.1038/s43586-023-00214-1>.
- De los Rios, I.C., Charnley, F.J.S., 2017. Skills and capabilities for a sustainable and circular economy: the changing role of design. *J. Clean. Prod.* 160, 109–122. <https://doi.org/10.1016/j.jclepro.2016.10.130>.
- Dissayake, D.G. an K., 2022. *Enabling Circular Fashion through Product Life Extension*, pp. 21–40.
- Dufva, M., Koivisto, R., Ilmola-Sheppard, L., Junno, S., 2017. Anticipating alternative futures for the platform economy. *Technol. Innov. Manag. Rev.* 7 (9), 6–16. <https://doi.org/10.22215/timreview/1102>.
- Edwards, P.N., 2010. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. MIT Press.
- Elia, V., Gnoni, M.G., Tornese, F., 2017. Measuring circular economy strategies through index methods: a critical analysis. *J. Clean. Prod.* 142, 2741–2751. <https://doi.org/10.1016/j.jclepro.2016.10.196>.
- Fletcher, K., Tham, M., 2014. *Routledge Handbook of Sustainability and Fashion*. Routledge, London.
- Geissdoerfer, M., Savaget, P., Bocken, N.M.P., Hultink, E.J., 2017. The Circular Economy – a new sustainability paradigm? *J. Clean. Prod.* 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>.
- Ghisellini, P., Cialani, C., Ulgiati, S., 2016. A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *J. Clean. Prod.* 114, 11–32. <https://doi.org/10.1016/j.jclepro.2015.09.007>.
- Gupta, G.R., 2000. Gender, Sexuality, and HIV/AIDS: the what, the Why, and the How. *Policy Law Rev.* 5, 86–93, vol. 5. *Policy Law Rev.*, pp. 86–93.
- Z. A. Hamstead, D. M. Iwaniec, T. Mcphearson, M. Berbés-Blázquez, E. M. Cook, and T. A. Muñoz-Erickson Editors, *Resilient Urban Futures*.
- Hobson, K., Lynch, N., 2016. Diversifying and de-growing the circular economy: radical social transformation in a resource-scarce world. *Futures* 82 (82), 15–25. <https://doi.org/10.1016/j.futures.2016.05.012>.
- Hoffman, J., Pelzer, P., Albert, L., Bénéker, T., Hajer, M., Mangnus, A., 2021. A futuring approach to teaching wicked problems. *J. Geogr. High Educ.* 45 (4), 576–593. <https://doi.org/10.1080/03098265.2020.1869923>.
- Interagency Gender Working Group, 2012. *IGWG Gender Integration Continuum* [Online]. Available: http://sbccimplementationkits.org/gender/wp-content/uploads/sites/7/2016/03/Activity-0.1_Understanding-and-Applying-the-Gender-Equity-Continuum.pdf. (Accessed 20 August 2022).
- International Labour Organisation, 2015. *Gender Equality and Green Jobs*. Green Jobs Programme [Online]. Available: https://www.ilo.org/global/topics/green-jobs/publications/WCMS_360572/lang-en/index.htm. (Accessed 28 March 2023).
- International Labour Organization, 2017. *The Future of Work We Want: A Global Dialogue* [Online]. Available: <http://www.ilo.org/futurewewant>.
- Iwaniec, D., 2013. *Integrating Visioning Research Education*. November.
- Iwaniec, D.M., et al., 2021. *Positive futures*. In: *Urban Book Series*. Springer Science and Business Media Deutschland GmbH, pp. 85–97.
- Jackson, M., 2013. *Practical Foresight Guide Chapter 3 – Methods*.
- Kania, J., Kramer, M., Senge, P., 2018. *THE WATER OF SYSTEMS CHANGE*.
- Kaplinsky, R., Morris, M., 2000. *Value chain development*. In: *Making Markets More Inclusive*. Palgrave Macmillan.
- Kelly, K.L., 1998. A systems approach to identifying decisive information for sustainable development. *Eur. J. Oper. Res.* 109 (2), 452–464. [https://doi.org/10.1016/S0377-2217\(98\)00070-8](https://doi.org/10.1016/S0377-2217(98)00070-8).
- Kirchherr, J., Reike, D., Hekkert, M., 2017. Conceptualizing the circular economy: an analysis of 114 definitions. *Resour. Conserv. Recycl.* 127, 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>.
- Köhler, A., et al., 2021. *Circular Economy Perspectives in the EU Textile Sector*. <https://doi.org/10.2760/858144>.
- Kotamaraju, V., Banerji, S., Roy, T., Charaya, N., 2021. *Building Evidence for Inclusive Circular Business Models in the Indian Fashion Industry* [Online]. Available: http://www.intellecap.com/wp-content/uploads/2021/08/Circular-Insights-Report_-2021_compressed.pdf. (Accessed 6 March 2023).
- Lacovidou, E., Hahladakis, J.N., Purnell, P., 2020. A systems thinking approach to understanding the challenges of achieving the circular economy. *Environ. Sci. Pollut. Res.* 28, 24785–24806.
- Laudes Foundation and BSR, 2020. *Keeping Workers in the Loop: towards an Inclusive & Regenerative Fashion System*.
- Llorente-González, L.J., Vence, X., 2020. How labour-intensive is the circular economy? A policy-orientated structural analysis of the repair, reuse, and recycling activities in the European Union. *Resour. Conserv. Recycl.* 162, 105033 <https://doi.org/10.1016/j.resconrec.2020.105033>.
- Luhmann, N., 1982. 12. The future cannot begin. In: *The Differentiation of Society*, vol. 43. Columbia University Press, pp. 271–288 no. 1.
- Maani, K.E., Cavana, R.Y., 2007. *Systems Thinking, System Dynamics: Managing Change and Complexity*, 2nd, Illust ed. Pearson Education New Zealand, p. 2007.
- Mao, C., Koide, R., Akenji, L., 2019a. *Society and Lifestyles in 2050: Insights from a Global Survey of Experts*. IGES Discussion Paper.
- Mao, C., Koide, R., Akenji, L., 2019b. *Society and Summary of Key Messages Lifestyles in 2050: Insights from a Global Survey of Experts*. Kanagawa, Japan.
- Markard, J., Raven, R., Truffer, B., 2012. Sustainability transitions: an emerging field of research and its prospects. *Res. Pol.* 41 (6), 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>.
- McMichael, P., Sardar, Z., 2000. Rescuing all our futures: the future of futures studies. *Contemp. Sociol.* 29 (1), 267. <https://doi.org/10.2307/2654968>.

- McPhearson, T., Iwaniec, D.M., Bai, X., 2016. Positive visions for guiding urban transformations towards sustainable futures. *Curr. Opin. Environ. Sustain.* 22, 33–40. <https://doi.org/10.1016/j.cosust.2017.04.004>.
- Meadows, D., 1999. *Leverage Points Places to Intervene in a System*.
- Merli, R., Preziosi, M., Acampora, A., 2018. How do scholars approach the circular economy? A systematic literature review. *J. Clean. Prod.* 178, 703–722. <https://doi.org/10.1016/j.jclepro.2017.12.112>.
- Miller, R. (Ed.), 2018. *Transforming the Future: Anticipation in the 21st Century*. Routledge.
- Ministry of Infrastructure and Water Management, "Policy Programme for Circular Textile 2020–2025," Jul. 2020. [Online]. Available: <https://www.government.nl/documents/parliamentary-documents/2020/04/14/policy-programme-for-circular-textile-2020-2025>.
- Morse, J.M., Barrett, M., Mayan, M., Olson, K., Spiers, J., 2002. Verification strategies for establishing reliability and validity in qualitative research. *Int. J. Qual. Methods* 1 (2), 13–22. <https://doi.org/10.1177/160940690200100202>.
- Munoz, J.E., 2009. *Cruising Utopia: the Then and There of Queer Futurity*. NYU Press [Online]. Available: <https://www.jstor.org/stable/j.ctt9qg4nr>. (Accessed 20 August 2019).
- Neetha, N., 2002. Flexible production, feminisation and disorganisation: evidence from tiruppur knitwear industry. *Econ. Polit. Wkly.* 37 (21), 2045–2052.
- Niinimäki, K., 2018. Sustainable fashion in a circular economy. *Sustain. Fashion*. *Circ. Econ.* 12–42.
- Ogilvy, J.A., 2002. *Creating Better Futures: Scenario Planning as a Tool for a Better Tomorrow*. Oxford University Press.
- Oomen, J., Hoffman, J., Hajer, M.A., 2022. Techniques of futuring: on how imagined futures become socially performative. *Eur. J. Soc. Theor* 25 (2), 252–270. <https://doi.org/10.1177/1368431020988826>.
- Padilla-Rivera, A., do Carmo, B.B.T., Arcese, G., Merveille, N., 2021. Social circular economy indicators: selection through fuzzy delphi method. *Sustain. Prod. Consum.* 26, 101–110. <https://doi.org/10.1016/j.spc.2020.09.015>.
- Pal, R., 2017. Sustainable design and business models in textile and fashion industry. In: *Sustainability in the Textile Industry*, pp. 109–138. Singapore.
- Pauliuk, S., 2018. Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations. *Resour. Conserv. Recycl.* 129 (129), 81–92. <https://doi.org/10.1016/j.resconrec.2017.10.019>.
- Porter, M.E., 1998. *Competitive Advantage: Creating and Sustaining Superior Performance*.
- Rask, N., 2022. An intersectional reading of circular economy policies: towards just and sufficiency-driven sustainabilities. *Local Environ.* 27 (10–11), 1287–1303. <https://doi.org/10.1080/13549839.2022.2040467>.
- Repp, L., Hekkert, M., Kirchherr, J., 2021. Circular economy-induced global employment shifts in apparel value chains: job reduction in apparel production activities, job growth in reuse and recycling activities. *Resour. Conserv. Recycl.* 171, 105621 <https://doi.org/10.1016/j.resconrec.2021.105621>.
- Ruiz-Real, J.L., Uribe-Toril, J., Valenciano, J.D.P., Gázquez-Abad, J.C., 2018. Worldwide research on circular economy and environment: a bibliometric analysis. *Int. J. Environ. Res. Publ. Health* 15 (12), 2699. <https://doi.org/10.3390/ijerph15122699>.
- Sools, A.M., Tromp, T., Mooren, J.H., 2015. Mapping letters from the future: exploring narrative processes of imagining the future. *J. Health Psychol.* 20 (3), 350–364. <https://doi.org/10.1177/1359105314566607>.
- Stahel, W.R., 2016. The circular economy. *Nature* 531 (7595), 435–438. <https://doi.org/10.1038/531435a>.
- Suarez-Visbal, L.J., Stuckrath, C., Rosales-Carreón, J., 2022a. Assessing through a gender-inclusion lens the social impact of circular strategies in the apparel value chain. In: Pál, V. (Ed.), *Social and Cultural Aspects of the Circular Economy*. Routledge, London, pp. 136–159.
- Suarez-Visbal, L.J., Rosales-Carreón, J., Corona, B., Worrell, E., 2022b. The social impacts of circular strategies in the apparel value chain; a comparative study between three countries. *Circ. Econ. Sustain.* <https://doi.org/10.1007/s43615-022-00203-8>.
- Suarez-Visbal, L.J., Stuckrath, C., Rosales-Carreón, J., 2023. Circular economy: an overview of global trends, challenges, and opportunities. In: *Accelerating Sustainability in Fashion, Apparel & Textiles*.
- Svenfelt, Å., et al., 2019. Scenarios for sustainable futures beyond GDP growth 2050. *Futures* 111, 1–14. <https://doi.org/10.1016/j.futures.2019.05.001>.
- E. Swyngedouw, "Interrogating post-democratization: reclaiming egalitarian political spaces," *Polit. Geogr.*, vol. 30, no. Issue 7, pp. 370–380.
- Tham, M., 2015. The futures of futures studies in fashion. In: *Routledge Handbook Of Sustainability And Fashion*, Kate Fletc. Routledge International Handbooks, Abingdon, Oxon, pp. 283–292.
- Vaccari, A., Vanni, I., 2021. Design cultures. In: *Fashion Futuring. Rethinking sustainable fashion design*, pp. 3448–3457.
- van den Ende, M., Wardekker, A. Dr, Mees, H. Dr, Hegger, D. Dr, Vervoort, J. Dr, 2021. *Towards a Climate-Resilient Future Together, A Toolbox with Participatory Foresight Methods, Tools and Examples from Climate and Food Governance*. Utrecht.
- Vervoort, J.M., Bendor, R., Kelliher, A., Strik, O., Helfgott, A.E.R., 2015. Scenarios and the art of worldmaking. *Futures* 74, 62–70. <https://doi.org/10.1016/j.futures.2015.08.009>.
- WBCSD, 2014. *Value Chain ' Definitions and Characteristics*. Value Chain.
- Weigend Rodríguez, R., Pomponi, F., D'Amico, B., 2019. Futures studies & the Circular Economy: an interdisciplinary approach to sustainable development. *Econ. Creat.* (11), 38–60. <https://doi.org/10.46840/ec.2019.11.03>.
- Witjes, S., Lozano, R., 2016. Towards a more Circular Economy: proposing a framework linking sustainable public procurement and sustainable business models. *Resour. Conserv. Recycl.* 112, 37–44. <https://doi.org/10.1016/j.resconrec.2016.04.015>.
- Wolfram, M., 2016. Conceptualizing urban transformative capacity: a framework for research and policy. *Cities* 51, 121–130. <https://doi.org/10.1016/j.cities.2015.11.011>.