PARTNERSHIPS FOR COOPERATION AND EXCHANGES OF PRACTICES

ERASMUS-EDU-2023-PEX-COVE 101194072

01-02-2025/31-01-2029

COVE REMODE

Unlocking Circular Fashion Design Excellence

RE MODE

UNLOCKING CIRCULAR FASHION DESIGN EXCELLENCE

D2.5 ANALYSIS OF CURRENT GOVERNANCE MODELS AND DEVELOPMENT OF IMPROVING DIRECTIVES

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REMODE

Unlocking Circular Fashion Design Excellence

ERASMUS-EDU-2024-PEX-COVE

Grant Agreement number: 101194072

D2.5 Analysis of current governance models and development of improving directives

Project: COVE ReMODE – Unlocking Circular Fashion Design Excellence	**Deliverable Number:** T2.5
Deliverable Title: Analysis of current governance models and development of improving directives	**WP2 Task:** 5
Lead Partner: University of Erlangen-Nuremberg (FAU)	**Due Date**: Month 15
Dissemination Level: Public	**Version:** 2
Authors: University of Erlangen-Nuremberg (FAU)	**Date**: 29/4/2026

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List of Acronyms

- C2C: Cradle-to-Cradle
- CBM: Circular Business Model
- CCC: Customer Communities Creation
- CDG: Circular, Digital & Green
- CE: Circular Economy
- CEAP: Circular Economy Action Plan
- CoVE: Centres of Vocational Excellence
- CNO: Collaborative Networked Organisation
- CSRD: Corporate Sustainability Reporting Directive
- DPP: Digital Product Passport
- EPR: Extended Producer Responsibility
- ESPR: Ecodesign for Sustainable Products Regulation
- EU: European Union
- GOTS: Global Organic Textile Standard
- HEIs: Higher Education Institutions
- HKRITA: Hong Kong Research Institute of Textiles and Apparel
- ISO: International Organization for Standardization
- LCA: Life Cycle Assessment
- MCDM: Multi-Criteria Decision Model
- NGO: Non-Governmental Organization
- PAS: Product as Service Arrangement
- PCR: Post-Consumer Recycled
- PEA: Primary Elements of Assessment
- REACH: Registration, Evaluation, Authorisation, and Restriction of Chemicals
- SA8000: Social Accountability 8000
- SAI: Social Accountability International
- SDG: Sustainable Development Goal
- SMART: Specific, Measurable, Achievable, Relevant, and Time-bound
- SME: Small and Medium-sized Enterprise
- SQ: Status Quo Arrangement
- SWOT: Strengths, Weaknesses, Opportunities, and Threats
- VCC: Virtual Customer Community
- VET: Vocational Education and Training
- VO: Virtual Organisation
- ZDHC: Zero Discharge of Hazardous Chemicals

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Executive Summary

The fashion industry currently faces intense pressure to address overproduction and resource consumption, making effective governance, defined as the systems and processes for collective decision-making, essential for systemic change. This report presents the REMODE Governance Framework and the REMODE Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) Directives, composing a holistic system designed to transition the fashion industry from a linear to a circular economy (CE).

The researchers utilized a qualitative, five-phase methodology to develop both the aforementioned framework and directives. The study is anchored in the Quantum Holistic Framework (Zafeiropoulou 2025), which views fashion governance as an emergent property of continuous interactions across three distinct levels. The macro level encompasses policy and institutional structures, such as European Union (EU) Circular Economy Action Plan (CEAP) and international standards such as International Organization for Standardization (ISO) and GOTS. The meso level focuses on fashion ecosystems, including brands, suppliers, and educational institutions. Finally, the micro level addresses individual agency by emphasizing worker rights, well-being, and the skill superposition of circular, digital, and green competencies.

The analytical process involved identifying additional eight governance models, followed by a comparative analysis to isolate core similarities and differences. These models were then aligned with institutional global standards such as Social Accountability 8000 (A social certification standard, SA8000), Higg Index, and B Corp certification. Through conceptual synthesis, the analysis is validated by empirical survey data from 107 Small and Medium-sized Enterprises (SMEs) across Italy, Germany, Greece, Türkiye, and Finland. Key empirical findings show a universal demand for capacity-building, with over 70% of respondents in all five countries expressing a need for training in legal compliance and Digital Product Passports (DPP). While Finland and Germany emerged as high-regulatory-literacy recipients, most SMEs across all regions still operate with only partial lifecycle data collection and inconsistent supplier engagement.

The analytical work culminates in the REMODE Governance Framework, which is a five-phase iterative system synthesized from the nine analysed models. The first two phases focus on foundation, participatory alignment, and structural governance. In these stages, organizations establish shared definitions of circularity and choose specific pathways, such as optimizing existing materials or adopting service-based models. Phases three and four involve operational integration and strategic decision-making, embedding management themes across the value chain while determining which core competencies to retain in-house. The final phase emphasizes scaling and evolution by expanding local pilots into industry-wide systems through open collaboration. To ensure operational viability, the framework incorporates SMART directives to guide organizations through each phase, moving from potentially vague sustainability commitments to verifiable results. The REMODE Governance Framework and SMART directives should be read as a bridge between WP2 evidence generation and the later design of CoVE-based skills ecosystems. Its added value is not only the classification of existing governance models, but also the conversion of SME evidence, regulatory pressures, and curriculum needs into implementable governance directives for VET providers, HEIs, SMEs, clusters, public authorities, and sectoral intermediaries.

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1. Introduction

The global fashion industry is increasingly under scrutiny for its unsustainable production and consumption patterns, which are characterised by complex value chains, intensive resource use, high waste generation, and persistent social inequities (Niinimäki et al., 2020). As pressure grows to address overproduction, pollution, and labour-related concerns, the transition toward CE has emerged as a key pathway for sustainability transformation (Ellen MacArthur Foundation, 2017; Bocken et al., 2016). Within this transition, governance plays a central role. It shapes how responsibilities are distributed, how decisions are coordinated across actors and levels, and how sustainability goals are translated into practice (Meadowcroft, 2007; Loorbach, 2010).

Despite the growing relevance of circular governance in fashion, existing approaches remain fragmented. Some frameworks focus on stakeholder participation, others on institutional incentives, value-chain coordination, business model change, or scaling strategies, but few bring these dimensions together in a coherent multi-level structure. This fragmentation makes it difficult for policymakers, firms, and educational actors to identify how governance, skills, and implementation mechanisms can be aligned in practice. The report addresses this gap by developing the ReMODE Governance Framework: a holistic, practice-oriented model designed to support the circular, digital, and green transition in the fashion and textile sector.

The report is anchored in the Quantum Holistic Framework (Zafeiropoulou, 2025), which serves as the overarching theoretical lens for understanding governance as an emergent property of interactions across macro, meso, and micro levels. Building on this lens, the report analyses eight governance models and relevant international standards and combines these insights with empirical findings from SMEs in five countries to construct the ReMODE Governance Framework. To ensure operational relevance, the framework is further translated into a set of SMART directives that can guide implementation in organisational and policy settings.

The report is structured as follows. Chapter 2 outlines the methodology used to identify, compare, and synthesise the governance models and empirical findings. Chapter 3 presents the empirical results from SMEs in Italy, Germany, Greece, Türkiye, and Finland, with particular attention to lifecycle data collection, regulatory awareness, supplier engagement, and training needs. Chapter 4 reviews the relevant literature on CE governance in the fashion industry, including key standards and governance models, and highlights their similarities and differences. Chapter 5 then presents the ReMODE- Governance Framework and SMART directives as the final synthesis of the report, showing how multi-level governance, capacity-building, and implementation logic can be brought together into a coherent model for circular transition.

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2. Methodology

This study adopts a qualitative, theory-building methodology to conceptualise the ReMODE Governance Framework (see Chapter 5), which serves as a foundation for the development of the ReMODE SMART directives. The proposed governance framework approaches the fashion industry as a complex, adaptive, and entangled socio-technical system, rather than a linear value chain. Drawing on the Quantum Holistic Framework (Zafeiropoulou, 2025), governance is understood as an emergent property arising from continuous interaction between macro (policy and institutional), meso (ecosystem and organisational), and micro (individual and skill-based) levels. These levels do not operate independently but co-evolve through feedback loops, observer effects, and non-linear transitions, reflecting quantum principles such as superposition, entanglement, uncertainty, and tunnelling. The methodological approach follows established practices for conceptual framework development, combining literature-based synthesis, comparative analysis, abductive reasoning, iterative validation through researcher reflexivity, and descriptive analysis of empirical data from SMEs (N=107) collected via online questionnaires. The methodology is explicitly designed to integrate fragmented governance knowledge into a coherent, multi-level model capable of addressing the complexity of circular transitions in the fashion industry. In what follows, the five research phases are presented:

2.1 Phase I: Identification of governance frameworks

In the first phase, one researcher collected relevant governance models and frameworks applicable to the fashion and textile sector. The selection focused on governance models addressing CE transitions, value-chain coordination, stakeholder participation, scalability, and institutional change. Apart from the Quantum Holistic Framework (Zafeiropoulou, 2025), eight more governance frameworks were identified as analytically relevant due to their explicit focus on sustainability governance, circularity, or systemic coordination in fashion-related contexts (Abdelmeguid et al., 2024; Christensen, 2021; Dragomir & Dumitru, 2022; Fischer & Pascucci, 2017; Hultberg & Pal, 2021; Mahanty & Domenech, 2024; Romero & Molina, 2011; Silva & Morais, 2022).

2.2 Phase II: Comparative analysis of governance models

In the second phase, two researchers independently and collaboratively analysed the nine governance frameworks to identify their core similarities, differences, and underlying assumptions. This stage followed principles of comparative qualitative analysis and thematic synthesis, which are widely used to integrate heterogeneous theoretical models (Thomas & Harden, 2008; Eisenhardt, 1989). Attention was paid to governance level (micro, meso, macro), governance mechanisms (regulatory, collaborative, incentive-based, informational), actor configurations, and intended system outcomes. Through iterative comparison, convergent themes and structural divergences were identified, allowing the researchers to distinguish complementary governance functions rather than treating models as competing alternatives.

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2.3 Phase III: Integration with global standards and international frameworks

In the third phase, the same two researchers examined the governance models in relation to globally recognised standards and policy frameworks to situate them within existing institutional architectures. This step corresponds to institutional mapping and framework alignment methods used in governance and policy studies (Scott, 2014; Ostrom, 2010). The analysis explicitly considered international and transnational standards and frameworks, including but not limited to:

- EU CEAP; Extended Producer Responsibility (EPR) regimes,
- ISO standards (ISO 14001, ISO 45001, ISO 9001, ISO 20400, ISO 26000); SA8000,
- Global Organic Textile Standard (GOTS),
- OEKO-TEX® standards,
- Bluesign® system,
- Higg Index; Fair Wear Foundation methodologies,
- B Corporation Certification.

This phase enabled the researchers to distinguish which governance functions are currently addressed through regulation, voluntary certification, market coordination, or data infrastructures, and where gaps or overlaps persist.

2.4 Phase IV: Conceptual synthesis using a quantum-holistic governance lens

In the fourth phase, two researchers jointly connected the insights from the comparative and institutional analyses to the Quantum-Holistic Governance Model (Zafeiropoulou, 2025) which underpins the ReMODE project. This phase employed abductive reasoning, a recognised method in theory construction that iteratively moves between empirical observations and theoretical interpretation (Dubois & Gadde, 2002). The quantum-holistic lens provided a systems-based interpretive structure that acknowledges non-linearity, feedback loops, co-evolution across governance levels, and the interdependence of actors. Through this synthesis, governance was conceptualised as an emergent property arising from interactions between macro-level institutions, meso-level ecosystems, and micro-level skills and agency.

2.5 Phase V: Iterative validation through collective reflection and comparative cross-country empirical data analysis

The final phase consisted of iterative validation through multiple rounds of discussion and collective reflection among three researchers, informed by empirical data[1] from 107 SMEs in Finland

[1] See ReMODE WP2–Task 2.1 for the questionnaire employed in the study.

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(N=18), Germany (N=17), Greece (N=23), Italy (N=29), and Türkiye (N=20), collected between October and December 2025 (see Chapter 3). The analysis combined descriptive statistics, frequencies, percentages, mean values, and standard deviations to characterise national response patterns and to compare readiness across countries. Frequencies and percentages were used to describe firm size, lifecycle data collection practices, regulatory awareness, training needs, and willingness to engage in DPP-related micro-credentials. Mean values on a 1-5 scale were used to assess central tendencies in supplier engagement and CE knowledge, while standard deviations were used to identify within-country dispersion and heterogeneity. This combination of descriptive and comparative analysis is appropriate for an exploratory SME dataset and supports the development of an evidence-informed governance framework without overstating statistical representativeness (Field, 2018; Pallant, 2020; Sullivan & Artino, 2013).

The survey was disseminated through institutional partners and professional networks in each country using non-probabilistic, convenience sampling and then analysed descriptively, where the key information served as a guidance to craft the REMODE Governance Framework and subsequently the ReMODE SMART Directives. This approach was chosen for reasons of cost, efficiency and feasibility within the scope of the study. This process aligns with reflexive validation and researcher triangulation approaches commonly used in qualitative and conceptual research to enhance robustness and credibility (Alvesson & Sköldberg, 2009; Flick, 2018). Rather than statistical validation, conceptual coherence, internal consistency, theoretical plausibility, and practical relevance were assessed through critical dialogue, challenge of assumptions, and refinement of framework boundaries and relationships. This collective sensemaking process ensured that the final framework was not the product of a single analytical perspective but a shared, critically examined synthesis, taking into consideration the empirical data from the five partner countries.

2.6 Ethics

The research was conducted in accordance with GDPR guidelines (2016) and the EU AI Act (2025). To support the preparation of the manuscript, DeepL and ChatGPT were employed for language polishing and phrasing suggestions (e.g., improving readability and consistency of expressions). No AI generated material was used without prior assessment of its trustworthiness. All conceptual, analytical, and empirical contributions originate from the authors.

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3. Empirical findings from Small and Medium-sized Enterprises

This chapter provides a comparative overview of the survey results across the five participating nations: Italy, Germany, Greece, Türkiye, and Finland. For each country, the analysis examines the organizational profile of the SMEs and their current progress regarding lifecycle data collection. Furthermore, it explores the internal landscape of these firms by discussing their awareness of upcoming EU textile regulations such as the Ecodesign for Sustainable Products Regulation (ESPR - EU 2024/1781), which mandates that textiles enter the market with higher durability and recyclability, notably introducing a ban on destroying unsold apparel, starting July 2026 for large firms and 2030 for medium enterprises. Central to this framework is also the Digital Product Passport (DPP), expected by 2027/2028, which requires a digital record of material provenance and chemical composition accessible via QR code (Regulation (EU) 2024/1781, 2024). These combined measures force a shift toward total supply chain transparency, requiring SMEs to overhaul their lifecycle data collection to maintain EU market access, the extent of their engagement with supply chain partners, and their specific requirements for capacity-building and professional training. Finally, each subsection assesses the self-reported knowledge levels of the respondents, highlighting the variations in CE expertise and internal capabilities across national contexts.

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3.1 Country context and SWOT overview

To contextualise the survey results, Table 1 below summarises the main country-specific strengths, weaknesses, and transition challenges identified through SWOT evidence, desk research, and expert validation.

Table 1: Country-Specific SWOT Summary of the Textile and Clothing Sector

Country	Strengths	Weaknesses / Threats
Finland	Advanced ecological textile fibre innovations, pilot projects, and a strong research landscape.	Slow legislative implementation and limited integration of sustainable and digital skills in the current VET provision.
Germany	Strong sustainability-related policy tools and frameworks, including the Green Button*, and established due diligence requirements.	Slow adoption by SMEs due to cost and complexity, and growing shortages and gaps in new digital and circular roles.
Greece	Long craft and design heritage, active micro-firms piloting circular approaches, and a strong reuse and vintage ecosystem.	Fragmented and still-evolving regulations, limited sorting and recycling capacity, and an EPR system that is not yet fully operational.
Italy	Global brand heritage and craftsmanship, and a supportive legislative framework.	Insufficient investment in sustainability and digital transformation, and fragmented regional policy implementation.
Türkiye	Robust export-oriented manufacturing base and growing design and branding capability.	Tightening EU traceability and due diligence expectations that may exclude non-compliant exporters, plus cultural barriers to second-hand consumption that inhibit circular business models.

* In Germany, the Green Button (Grüner Knopf) is a government-run certification label that combines product-level environmental and social criteria with a company-level assessment of corporate due diligence, making it a notable example of integrated textile governance.

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3.2 Survey findings by country

3.2.1 Italy

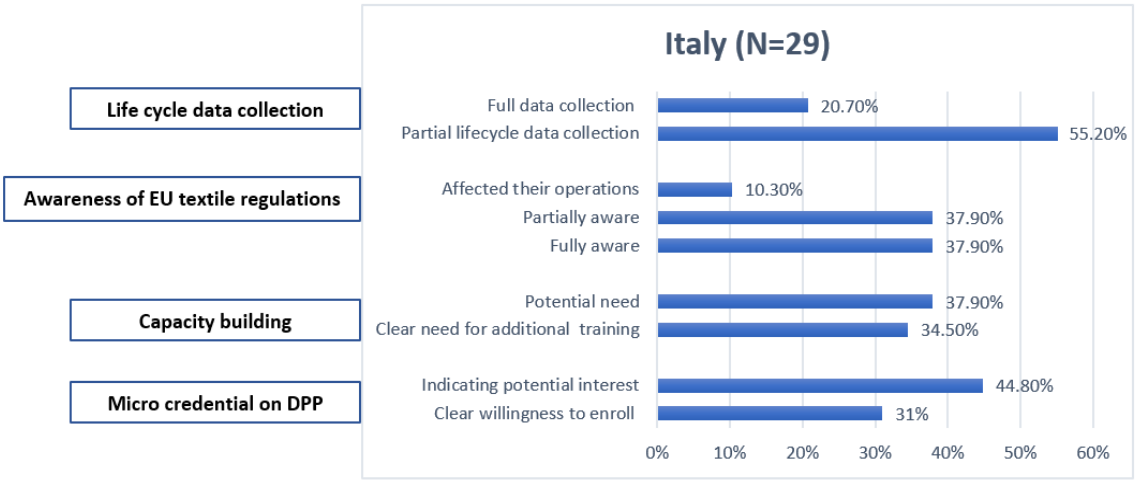
Italy represents the largest national subsample in the survey (29 out of 107 respondents). Italian SMEs are predominantly micro and small enterprises, with lifecycle data collection most frequently reported as partial. Specifically, 16 respondents (55.2%) indicate partial lifecycle data collection, while 6 respondents (20.7%) report full data collection across product stages.

Awareness of upcoming EU textile and circularity regulations is relatively widespread. A total of 11 respondents (37.9%) report being fully aware, while an additional 11 respondents (37.9%) indicate partial awareness. Only 3 respondents (10.3%) report that these regulations have already affected their operations.

Supplier engagement levels in Italy show a mean score of 3.33 (SD = 1.18) on a 1–5 scale, indicating moderate engagement. In terms of capacity-building, 10 respondents (34.5%) report a clear need for additional legal compliance training, while 11 respondents (37.9%) indicate a potential need. Similarly, 9 respondents (31.0%) express a clear willingness to enrol staff in a Digital Product Passport (DPP) micro-credential, with an additional of 13 respondents (44.8%) indicating potential interest.

Lastly, Italian SMEs report a mean CE knowledge score of 3.33 (SD = 1.18). This indicates moderate knowledge on average, combined with the highest dispersion among the countries, pointing to substantial differences in internal capabilities across Italian firms. The results are shown in Fig. 1 below.

Figure 1: National level analysis for Italy



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3.2.2 Germany

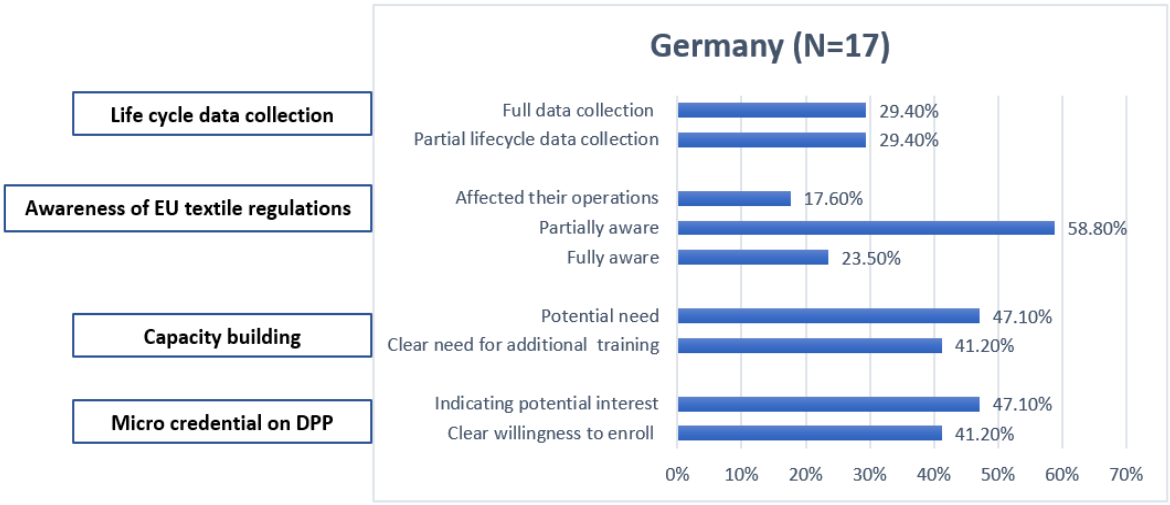
Germany brings 17 responses in the sample. German SMEs are predominantly micro and small enterprises. Lifecycle data collection is mixed, with 5 respondents (29.4%) reporting partial collection and an equal number of respondents (29.4%) reporting full data collection across product stages.

Awareness of EU textile and circularity regulations is mixed. Four respondents (23.5%) report full awareness, while 10 respondents (58.8%) indicate partial awareness. Only 3 respondents (17.6%) report that regulations have already influenced their operations.

Supplier engagement scores average 3.62 (SD = 0.89), indicating relatively strong engagement compared to other countries. Training demand remains evident, with 7 respondents (41.2%) indicating a clear need for legal compliance training and 8 respondents (47.1%) indicating a potential need. Similarly, 7 respondents (41.2%) express a clear willingness to enrol staff in DPP microcredentials, with 8 respondents (47.1%) indicating potential interest.

German respondents report a mean CE knowledge score of 3.50 (SD = 0.63). Scores cluster closely around the mean, indicating relatively homogeneous knowledge levels. This places Germany among the most competitive countries, though slightly below Finland in terms of average self-assessed expertise. The above results are graphically shown in Fig. 2 below.

Figure 2: National level analysis for Germany



3.2.3 Greece

Greek respondents account for 23 organizations in the sample, with the majority being micro-sized enterprises. Lifecycle data collection remains limited, with 13 respondents (56.5%) reporting partial data collection and 10 respondents (43.5%) reporting full lifecycle data collection.

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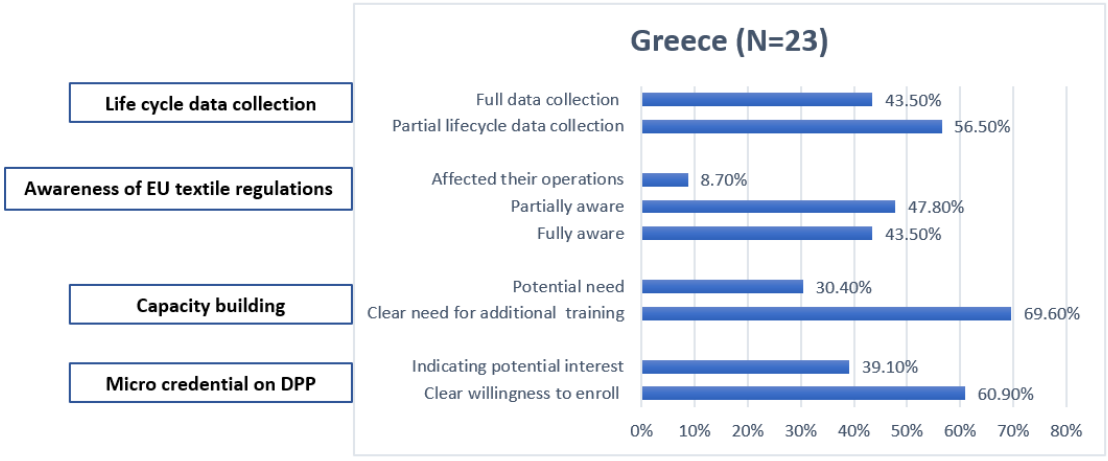
Awareness of EU textile and circularity regulations is predominantly partial. Eleven respondents (47.8%) report being somewhat aware, while 10 respondents (43.5%) report full awareness. Only 2 respondents (8.7%) indicate that regulations have already influenced their operations.

Supplier engagement in Greece shows a mean score of 3.13 (SD = 0.81). Regarding skills and training, 16 respondents (69.6%) indicate a clear need for legal compliance training, while 7 respondents (30.4%) indicate a potential need. Similarly, 14 respondents (60.9%) express a clear interest in enrolling staff in a DPP-related micro-credential, with an additional 9 respondents (39.1%) indicating potential interest.

Greek SMEs report a mean CE knowledge score of 3.57 (SD = 0.84). While the average level is comparable to Germany, the higher standard deviation indicates greater heterogeneity, suggesting that some firms possess relatively strong knowledge while others remain at more basic levels. The results are shown in Fig. 3 below.

Figure 3: National level analysis for Greece



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3.2.4 Türkiye

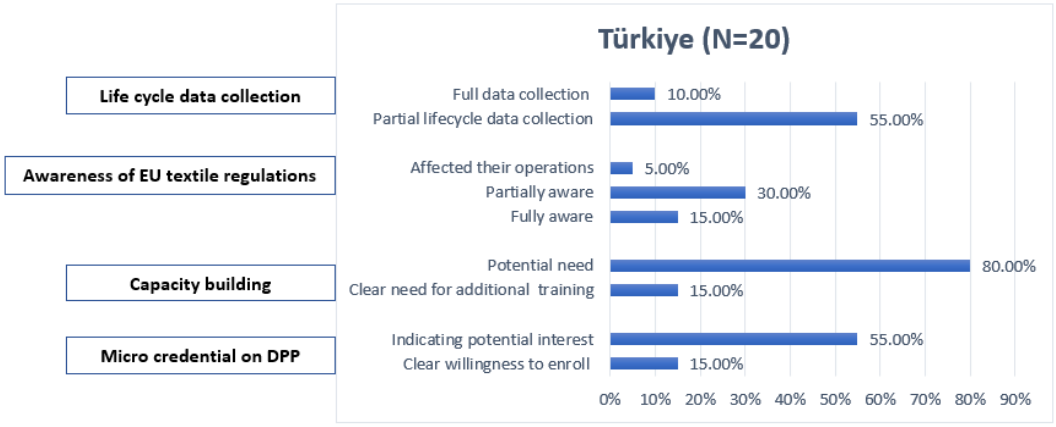
Türkiye contributes 20 responses to the survey, with the majority of respondents representing small and medium-sized SMEs. Lifecycle data collection is primarily partial or absent. Specifically, 11 respondents (55.0%) report partial data collection, and only 2 respondents (10.0%) report full data coverage.

Awareness of EU circularity regulations is more limited compared to other countries. Six respondents (30.0%) report partial awareness, while only 3 respondents (15.0%) report full awareness. Regulatory impact on operations is currently limited, with only 1 respondent (5.0%) reporting direct effects.

Supplier engagement scores in Türkiye average 3.30 (SD = 1.03). Training demand remains visible, with 3 respondents (15.0%) indicating a clear need for legal compliance training and 16 respondents (80.0%) indicating a potential need. Similarly, 3 respondents (15.0%) express clear interest in DPP-related training, while 11 respondents (55.0%) indicate potential interest.

Türkiye stands out with a substantially lower average CE knowledge score of 2.35 (SD = 0.93). This indicates that, on average, Turkish SMEs perceive their CE knowledge as below moderate, highlighting a capability gap related to the other countries in the sample. The results are shown in Fig. 4 below.

Figure 4: National level analysis for Türkiye



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3.2.5 Finland

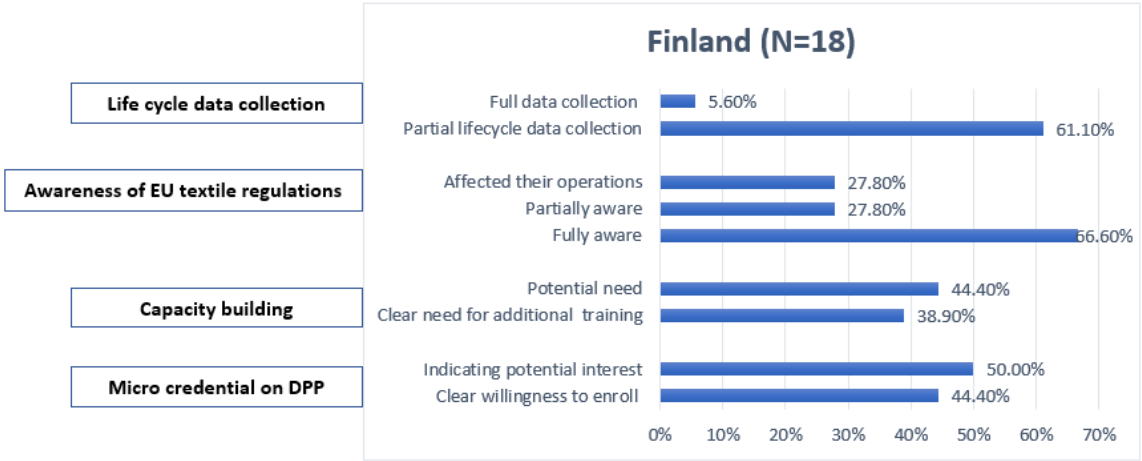
Finland accounts for 18 respondents in the dataset, with most representing micro and small SMEs. Lifecycle data collection is less comprehensive than in several other countries, with only 1 respondent (5.6%) reporting full lifecycle data collection and 11 respondents (61.1%) reporting partial collection.

Awareness of EU textile and circularity regulations is high among Finnish SMEs. Twelve respondents (66.6%) report full awareness, while 5 respondents (27.8%) report partial awareness. In addition, 5 respondents (27.8%) indicate that regulations have already affected their operations.

Supplier engagement levels in Finland are among the highest observed, with a mean score of 3.50 (SD = 1.04). In terms of capacity-building, 7 respondents (38.9%) report a clear need for additional legal compliance training, while 8 respondents (44.4%) indicate a potential need. Similarly, 8 respondents (44.4%) report a clear interest in additional legal or DPP-focused training, with 9 respondents (50.0%) indicating potential interest.

Finnish SMEs report the highest self-assessed CE knowledge among all countries in the sample. The average score is 3.78 (SD = 0.81), indicating that most respondents perceive their knowledge as above moderate, with relatively low dispersion. This suggests a more consistent level of CE understanding across Finnish SMEs. The results are shown in Fig. 5 below.

Figure 5: National level analysis for Finland



3.3 Comparative cross-country analysis

The cross-country comparison highlights clear differences in circular economy readiness, regulatory awareness, and internal capacity levels among SMEs, while also revealing several common structural patterns across countries, as follows:

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- **Shared strengths:** All countries emphasize design excellence and brand heritage, and each reports at least one concentrated innovation cluster acting as a living laboratory. The report also highlights early digital traceability pilots and regulatory momentum as shared strengths.
- **Common weaknesses:** Dependency on imported inputs and scarcity of low-impact materials at industrial scale, alongside fragmented SME skills and patchy end-of-life infrastructure.
- **Shared opportunities:** Regulatory pull from EPR and DPP requirements creating demand for compliance, eco-design, and reverse logistics, plus growing consumer appetite for thrift, rental, and repair and available EU and national funding for Industry 4.0 retrofits and reskilling.
- **Common threats**: Intense cost competition from fast-fashion imports, regulatory complexity and escalating audit costs for SMEs, and wider external shocks affecting supply chains and operating costs.

3.3.1 Lifecycle Data Collection

Lifecycle data collection practices vary substantially, though partial data collection is the dominant pattern in all national contexts. Finland reports the highest share of partial lifecycle data collection at 61.1% , followed by Greece at 56.5% , Italy at 55.2% , and Türkiye at 55.0%. Germany shows a more balanced distribution, with equal shares of 29.4% reporting both partial and full lifecycle data collection. Notably, Greece reports the highest rate of full lifecycle data collection at 43.5% , while Finland stands out with the lowest share of full collection at only 5.6%. Overall, these results suggest that end-to-end lifecycle data integration remains limited, with most SMEs operating at an intermediate stage characterized by partial data availability.

3.3.2 Awareness of EU Textile and Circularity Regulations

Awareness of upcoming EU textile and circularity regulations also differs markedly across the sample. Finland exhibits the highest level of awareness, with 66.6% of respondents reporting full awareness. Greece and Italy occupy intermediate positions, with 43.5% and 37.9% of respondents, respectively, reporting full awareness. Germany reports a lower share of full awareness at 23.5% but a very high level of partial awareness at 58.8%, indicating broad but not comprehensive familiarity. Türkiye demonstrates the lowest awareness levels, with only 15% reporting full awareness and 30% reporting partial awareness.

3.3.3 Regulatory Impact on Operations

Despite differences in awareness, the direct operational impact of these regulations remains limited across all countries. Finland and Germany report the highest shares of SMEs already affected by regulations, at 27.8% and 17.6%, respectively. Italy follows with 10.3%, while Greece (8.7%) and Türkiye (5.0%) report minimal current regulatory impact. This pattern indicates a clear gap between regulatory awareness and operational implementation, suggesting that many SMEs are still in a preparatory or early transition phase.

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3.3.4 Supplier Engagement

Supplier engagement levels are moderate across all countries but display a consistent ranking. Germany records the highest average supplier engagement score with a mean of 3.62, followed by Finland (3.50), Italy (3.33) and Türkiye (3.30) showing similar mid-range engagement levels, while Greece reports the lowest average score of 3.13. These differences suggest that supplier collaboration on circularity is more structured in Germany and Finland, whereas engagement in the other regions remains more uneven.

3.3.5 Circular Economy Knowledge

Self-assessed CE knowledge reveals pronounced cross-country differences. Finland reports the highest average knowledge score with a mean of 3.78, followed by Greece at 3.57 and Germany at 3.50. Italy reports a moderate average score of 3.33 but is accompanied by the highest dispersion, indicating substantial differences in internal capabilities across Italian firms. Türkiye reports a markedly lower average score of 2.35, highlighting a knowledge gap in relation to all other countries in the sample.

3.3.6 Training Demand and Skills Gaps

Across all countries, training demand remains high regardless of current readiness levels. A clear or potential need for legal compliance training is reported by 100% of Greek respondents, 95% of Turkish, 88.3% of German, 83.3% of Finnish, and 72.4% of Italian respondents. Similarly, interest in Digital Product Passport (DPP) related training, either clear or potential, exceeds 70% in all countries, with Greece and Finland showing the strongest overall interest. This convergence indicates that skills gaps persist across all national settings. Table 2 below summarizes the above data in a tabular form for ease of reading and understanding the concepts.

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Table 2: Comparative Analysis of Five Countries (Italy, Germany, Greece, Türkiye, Finland)

Metric	Italy (N=29)	Germany (N=17)	Greece (N=23)	Türkiye (N=20)	Finland (N=18)
Partial Lifecycle Data	55.2%	29.4%	56.5%	55.0%	61.1%
Full Lifecycle Data	20.7%	29.4%	43.5%	10.0%	5.6%
Full Regulatory Awareness	37.9%	23.5%	43.5%	15.0%	66.6%
Already Affected by Regs	10.3%	17.6%	8.7%	5.0%	27.8%
Supplier Engagement (Mean)	3.33	3.62	3.13	3.30	3.50
CE Knowledge (Mean)	3.33	3.50	3.57	2.35	3.78
Legal Training Need (Total)	72.4%	88.3%	100%	95.0%	83.3%
DPP Interest (Total)	75.8%	88.3%	100%	70.0%	94.4%

3.4 Readiness Profiles Across Countries

The empirical results reveal several critical trends regarding transition to CE across the surveyed regions. Most notably, no single nation currently demonstrates comprehensive readiness. Across all contexts, SMEs are characterised by fragmented lifecycle data collection and inconsistent supplier engagement. This suggests that even the most developed industrial landscapes remain in a transitional phase and have not yet achieved systemic operational maturity.

At the same time, the cross-country comparison points to a tiered landscape of readiness. Finland and Germany can be described as competitive actors, as both exhibit relatively high levels of “soft” integration. Finland stands out in terms of regulatory literacy and self-assessed CE knowledge, while Germany shows the strongest degree of structured supplier engagement. However, in both cases a translation gap remains: these cognitive and organisational strengths have not yet fully translated into “hard” operational shifts, as reflected in the still limited degree of full lifecycle data integration.

Greece may be characterised as technically capable. It reports the highest share of full lifecycle data collection (43.5%) and a universal demand for training, yet only limited direct regulatory impact on current operations is observed. This suggests that Greek SMEs possess a degree of technical preparedness but remain only partially activated by external policy pressure. In other

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words, they appear capable of operationalising circular practices more fully once regulatory and market conditions intensify.

Italy occupies what may be described as a fragmented middle position. While average scores for awareness, engagement, and CE knowledge are moderate, the comparatively high dispersion of results points to substantial internal heterogeneity. This suggests a bifurcated landscape in which a smaller group of frontrunner firms coexists with a larger group of SMEs that continue to face foundational challenges in scaling circular practices and integrating data-driven governance.

Türkiye represents the foundational tier within the sample. Significant structural hurdles remain, particularly in relation to the comparatively low mean score for CE knowledge (2.35) and the limited awareness of upcoming EU circularity-related regulation. At the same time, the high level of interest in legal compliance and DPP-related training indicates a willingness to adapt. For this context, however, the immediate priority appears to be basic capacity-building rather than the implementation of more advanced governance instruments such as Digital Product Passports.

A primary unifying pattern across all countries is the universal demand for capacity-building. With interest in legal compliance and DPP-related training exceeding 70% in every national context, the perceived skills gap emerges as a shared cross-border barrier to circular transition. This common pattern suggests that although countries differ in terms of readiness, regulatory familiarity, and internal capabilities, they converge strongly in their recognition that workforce development and targeted upskilling are essential.

The transition from theoretical awareness to practical implementation remains incomplete. While Finland and Germany emerge as the most informed contexts and Italy remains internally heterogeneous, the broader evidence suggests that SMEs across all partner countries are still navigating the early to intermediate stages of circular transition. The findings therefore underline the need for structured, multi-level support mechanisms capable of translating technical potential into operational reality.

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3.5 Priority Skill Gaps, Capacity Needs & Implications for the ReMODE Governance Framework

The empirical findings confirm a shared strategic direction across countries centred on digital traceability, circular design, and policy-driven demand, while also showing that the barriers to implementation differ across contexts and therefore require tailored interventions. Across all national settings, however, one issue emerges consistently: the transition toward circularity is constrained not only by regulation or infrastructure, but also by significant gaps in skills, organisational capacity, and coordination.

More specifically, the findings point to five priority competence areas that are particularly relevant for supporting circular, digital, and green transition in the textile and clothing sector, as follows:

1. Zero-waste and modular pattern-making: Core circular design competence that reduces off-cuts and embeds design-for-disassembly logic.
2. Digital Product Passport data capture and traceability: Applied capability to structure product data, define data fields, and integrate scanning or RFID processes on the shop floor, including traceability hand-offs that may involve blockchain-based systems.
3. Life-cycle impact assessment (LCA) and data literacy: Ability to translate sustainability claims into auditable evidence linked to reporting obligations such as CSRD and related certification and reporting practices.
4. Advanced fibre identification and sorting for recycling: Combining material knowledge with handling of sorting and recycling processes, supporting future automated sorting lines.
5. System leadership and cluster facilitation competences: Negotiation, coordination, data governance, and public funding skills needed to orchestrate partnerships, enable hubs, and remove practical barriers that block circular scaling.

These priority skill gaps have direct implications for curriculum design. New programmes should adopt spiral, hybrid, and modular learning structures that allow learners and workers to build competences progressively over time. In particular, stackable micro-credentials in the range of 5 to 10 ECTS could offer a flexible mechanism for upskilling in line with regulatory timelines without requiring full programme re-enrolment. Such formats would be especially suited to SMEs, which often face resource constraints and cannot easily release staff for long periods of training.

The findings also carry important implications for policy and governance. National and regional actors should reduce uncertainty by providing stable multi-year roadmaps for key regulatory instruments, including the EcoDesign for Sustainable Products Regulation (ESPR), Digital Product Passports (DPPs), and Extended Producer Responsibility (EPR) milestones. At the same time, non-technical barriers such as zoning constraints, real estate limitations, and weak local infrastructure should be addressed through targeted pilots and enabling mechanisms, including initiatives such as Circular Use Classes and other place-based interventions that support circular business operations and ecosystem development.

A further implication concerns the need to bridge the gap between policy ambitions, organisational capacity, and workforce readiness within the scope of the project's Work Package 2 and beyond. In this respect, the Pedagogical Approach (Task 2.3) can be understood as a cross-cutting enabler that translates multi-level demands into training design. By aligning educational provision with

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the Occupational Taxonomy Report (Task 2.4) and the wider policy context via Regulatory Framework Analysis (2.4), it helps ensure that training is not only technically relevant but also institutionally and strategically coherent. The ReMODE project uses the SWOT Analysis and focus group findings (Task 2.1), together with the comparative SME evidence, to move beyond generic skill lists toward context-sensitive capacity-building packages. These packages combine technical competences with the system-level capabilities required to implement circular change across ecosystems. Taken together, these empirical insights reveal the practical governance gaps, capacity needs, and transition challenges that shape circular transformation across the five national contexts. The following analytical review of literature contextualises these findings within existing debates and governance models, thereby establishing the conceptual foundation for the development of the ReMODE Governance Framework and SMART Directives.

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4. Analytical Review of Governance Models

This chapter reviews the key concepts, standards, and governance models relevant to circular transition in the fashion industry. It first outlines the theoretical foundations of CE and governance, then examines the international standards and governance frameworks that inform the ReMODE approach, followed by the identification of the main similarities and differences across the selected models.

4.1 Governance in the Fashion Industry and Circular Economy

A CE is an economic system designed to be restorative and regenerative, keeping products, components, and materials at their highest utility and value for as long as possible. Unlike the linear "extract–produce–use–dump" model, it seeks to close material loops through reducing, re-using, recycling, remanufacturing, and recovering resources so they remain in circulation rather than becoming waste (Kirchherrr et al., 2023; Geisendorf and Pietrulla, 2017). At the organizational level, it involves planning processes and practices that extend product use and manage resource flows effectively across ecosystems, economic systems, and product cycles for the benefit of customers and society (Alhawari et al. 2021). Common elements across definitions include designing for restoration and regeneration, distinguishing between technical cycles (for materials such as metals and polymers) and biological cycles (for nutrients that can safely return to nature), and linking circularity to broader sustainability goals.

Cradle to Cradle (C2C) is a design framework closely aligned with CE thinking, but it places stronger emphasis on positive impact by treating products as nutrients within either biological or technical cycles (Braungart et al. 2007). Its three core principles are that waste should become food for another process, systems should rely on renewable energy, and diversity in materials, systems, and ecosystems should be encouraged (Zhang et al. 2023). This highlights the distinction between eco-efficiency and eco-effectiveness (Niero et al. 2017): eco-efficiency focuses on reducing resource use, emissions, and waste within existing systems, whereas eco-effectiveness aims to redesign products and systems so material flows are inherently beneficial, non-toxic, and capable of continuous cycling. In practice, CE initiatives often combine both approaches by improving resource efficiency while also keeping materials in productive use across multiple loops. Table 3 below summarizes the main differences and overlaps between CE, C2C, eco-efficiency, and eco-effectiveness in terms of their aims, design focus, and relation to C2C principles.

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Table 3: Comparison of Circular Economy, Cradle to Cradle, Eco-efficiency, and Eco-effectiveness

Concept	Core aim	Design focus	Role of C2C principles
Circular economy	Close loops; keep value of products/materials; reduce virgin resource use	System-level loops (reuse, repair, remanufacture, recycle) in technical/biological cycles	Sometimes implicitly aligned; not always fully adopted
Cradle to Cradle	Create beneficial material metabolisms and upcycling	Product and system design as nutrients in safe cycles	Explicit: waste=food, renewable energy, celebrate diversity
Eco-efficiency	Reduce environmental impact per unit of value	Incremental efficiency in existing processes	May support, but does not require C2C-level redesign
Eco-effectiveness	Optimize overall ecological and economic benefit; eliminate waste/toxicity	Fundamental redesign of materials, products, and systems	Operationalized via C2C principles and nutrient cycles

In the context of the CE, governance extends beyond traditional regulatory mechanisms to include networked, participatory, and multi-stakeholder models that address interdependencies across the fashion value chain (Kirchherr et al., 2018). Unlike linear governance structures that are typically hierarchical and compliance-driven, circular governance models emphasize collaboration, transparency, and adaptive learning (Korhonen, Nuur, Feldmann, & Birkie, 2018). Such frameworks recognize that no single actor, whether a corporation, policymaker, or consumer, possesses the capacity to drive systemic change alone. Instead, they rely on distributed forms of governance where authority and accountability are shared among industry actors, governments, NGOs, and consumers (Geissdoerfer et al., 2017).

The governance of circularity within the fashion industry requires new institutional arrangements, business models, and collaborative mechanisms to foster innovation while ensuring socio-environmental equity. It encompasses participatory stakeholder engagement across product lifecycles, policy integration at multiple scales (local, national, and global), and adaptive policy learning to respond to technological and market dynamics (Dentoni, Bitzer, & Schouten, 2018). Moreover, effective governance frameworks integrate mechanisms for knowledge co-creation, co-innovation, and reflexive monitoring, enabling stakeholders to iteratively align goals and strategies (Todeschini et al., 2017).

Cohen and Munoz (2017) highlight the emergence of hybrid governance models in the fashion sector that combine state regulation, corporate responsibility, and community-based innovation. These include participatory value chain governance, multi-stakeholder co-innovation, and institu-

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tional transition frameworks that collectively promote transparency, traceability, and shared accountability throughout production and consumption systems (Pedersen & Andersen, 2015). The proliferation of such models reflects a broader paradigm shift in sustainability governance from command-and-control structures toward more integrative, relational, and systems-oriented approaches (Mazzucato, 2021; Zafeiropoulou 2025).

Understanding governance in the fashion industry requires examining how institutional logics, economic incentives, and social norms intersect to enable or constrain circular transitions. Governance is not merely an administrative function but a strategic enabler of transformation that facilitates the coordination of actors, the diffusion of circular innovations, and the embedding of sustainability principles within organizational and policy frameworks (Whalen, 2019).

The following section will explore first relevant international standards followed by the nine governance models that have been proposed and applied within the fashion industry, each offering unique insights into how circularity can be operationalized through participatory design, co-innovation, institutional restructuring, and multi-criteria decision frameworks. To situate the following discussion, Table 4 below presents the key international standards and governance models that inform the ReMode governance model on how circularity can be implemented in the fashion industry.

Table 4: Overview of International Standards and Governance Models for Circularity in the Fashion Industry

International Standards	Governance models
The Global Organic Textile Standard (GOTS)	The Quantum Holistic Framework
The EU Circular Economy Action Plan	Participatory Value Chain Framework
SA8000	Multi-Stakeholder Co-Innovation Framework
ISO 14001, ISO 45001, ISO 9001, and ISO 20400	Institutional Incentives and Dual Transition Framework
The Fair Wear Foundation	Collaborative Networks for Value Co-Creation Framework
OEKO-TEX®	Strategic Governance Across the Value Chain Framework
The Higg Index	Multi-Criteria Governance for Waste Management Framework
The Bluesign® system	Scalability and Conceptual Governance Model Framework
B Corporation Certification	Circular Business Models and Retail Governance Framework

4.1.1 International standards

When critically evaluating global standards and frameworks for inclusion in an all-encompassing governance model for the fashion industry, it is important to recognise that each standard governs a specific risk domain, governance level, or decision function. None of them alone can deliver

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systemic change, but each contributes essential elements that address well-documented governance failures in fashion, such as weak supply-chain oversight, fragmented accountability, greenwashing, labour exploitation, and poor environmental controls. A robust governance model must therefore selectively integrate their strongest elements while also acknowledging their limitations.

The Global Organic Textile Standard (GOTS) contributes to a strong model of supply-chain-wide certification that integrates both environmental and social criteria. Its most important governance element is the requirement for full chain-of-custody certification, which prevents selective compliance and forces brands to take responsibility beyond first-tier suppliers. GOTS also demonstrates the value of independent third-party auditing and accreditation systems that are institutionally separated from brands themselves, strengthening credibility and trust. However, GOTS is limited in scope to organic fibres and does not address broader issues such as overproduction, circularity, or business model change. From a governance perspective, the critical element to retain is not the organic focus itself but the principle of comprehensive, audited supply-chain responsibility and globally recognised labelling that reduces false sustainability claims (Global Standard gGmbH, n.d.).

The EU Circular Economy Action Plan (CEAP, 2020) introduces a fundamentally different type of governance, rooted in public authority and regulatory power. Its most critical contribution is the use of mandatory requirements rather than voluntary commitments, particularly through extended producer responsibility, product durability and recyclability requirements, waste collection obligations, and bans on destructive practices such as destroying unsold goods. The Action Plan also introduces system-level tools such as the Digital Product Passport, which enables transparency and data sharing across actors. For an all-encompassing fashion governance model, the key elements to include are binding obligations, lifecycle-based regulation, and data infrastructure that shifts responsibility upstream to producers. At the same time, CEAP is geographically limited to the EU and depends heavily on national enforcement capacity, meaning it must be complemented by global and private governance mechanisms to avoid regulatory leakage (European Commission, n.d.).

SA8000 contributes to a focused and rigorous framework for labour governance and worker protection. Its strongest element is the explicit grounding of standards in international human rights and labour conventions, combined with enforceable requirements such as living wages, freedom of association, and worker grievance mechanisms. Unlike many social audits, SA8000 emphasises worker participation and continuous improvement rather than one-off compliance checks. For a fashion governance model, SA8000 demonstrates the necessity of embedding worker voice, formal grievance systems, and rights-based benchmarks into governance structures. However, SA8000 operates primarily at the factory level and does not sufficiently address purchasing practices, brand behaviour, or power asymmetries higher up the value chain, which must therefore be addressed elsewhere in the governance model (Social Accountability International [SAI], n.d.).

The ISO framework contributes to a modular, process-oriented approach to governance that is highly scalable across global supply chains. Standards such as ISO 14001, ISO 45001, ISO 9001, and ISO 20400 are particularly valuable because they institutionalise management systems rather than prescribing fixed outcomes. This allows organisations to embed environmental, occupational safety, quality, and sustainable procurement considerations into everyday decision-making. From a governance standpoint, ISO's most important contribution is the normalisation of continuous improvement, documentation, internal accountability, and traceability. However, ISO

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standards are largely voluntary and focus on management processes rather than performance thresholds, meaning they can legitimise weak outcomes if not paired with stronger normative or regulatory requirements (International Organization for Standardization [ISO], n.d.).

The Fair Wear Foundation represents a governance model centred on multi-stakeholder engagement and human rights due diligence. Its most critical contribution is the recognition that labour conditions cannot be governed solely through audits, but require ongoing dialogue, remediation processes, and shared responsibility between brands and suppliers. The emphasis on worker complaint mechanisms and brand performance assessments directly addresses power imbalances in global garment supply chains. For an all-encompassing governance model, Fair Wear demonstrates the importance of participatory governance, transparency about brand practices, and remediation over punishment. Its limitation lies in its voluntary nature and relatively small brand membership, which constrains its systemic impact unless such approaches are scaled or embedded into regulation (Fair Wear Foundation, n.d.).

OEKO-TEX® contributes a product- and chemical-focused governance lens that addresses consumer safety and upstream chemical risks. Its key governance element is the rigorous testing of materials and chemicals against evolving scientific evidence, supported by a global network of accredited laboratories. Labels such as STANDARD 100 and MADE IN GREEN also demonstrate how traceability and transparency can be communicated to consumers in a credible way. From a governance perspective, OEKO-TEX® highlights the importance of science-based thresholds, input-level controls, and consumer-facing verification. However, it does not address broader social issues, business models, or total environmental impact, and therefore must function as a specialised pillar within a larger governance architecture (OEKO-TEX Service GmbH, n.d.).

The Higg Index contributes an important data-driven governance mechanism by enabling measurement, benchmarking, and performance comparison across the value chain. Its modular structure allows different actors to assess impacts relevant to their role, from facilities to brands. The critical governance element here is not the scores themselves but the creation of a shared measurement language that can inform decision-making, policy alignment, and continuous improvement. However, the Higg Index has been criticised for reliance on self-reported data, inconsistent verification, and misuse in marketing claims. For an all-encompassing governance model, Higg-type tools must therefore be embedded within stronger accountability frameworks that limit greenwashing and ensure appropriate use of data (Worldly, 2023; Sustainable Apparel Coalition, n.d.).

The Bluesign® system offers a strong example of preventative governance through input stream management. Its most important contribution is the shift from downstream testing to upstream control, ensuring that hazardous substances are eliminated before they enter production processes. This approach reduces risks to workers, ecosystems, and consumers simultaneously and aligns well with regulatory frameworks such as REACH and ZDHC. From a governance perspective, Bluesign demonstrates the effectiveness of early intervention, supplier network governance, and digital chemical management tools. Its limitation is its technical and chemical focus, which does not address social justice, overproduction, or consumption patterns (Bluesign Technologies AG, n.d.).

Finally, B Corporation Certification introduces a holistic, company-level governance model that integrates social, environmental, and governance performance across the entire organisation. Its most distinctive contribution is the legal embedding of stakeholder governance, which shifts corporate decision-making away from shareholder primacy and creates long-term accountability for

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impact. The B Impact Assessment also encourages cross-functional integration of sustainability into governance, strategy, and culture. However, B Corp certification focuses on the firm rather than the product or supply chain and remains voluntary, meaning its systemic influence depends on market uptake and policy recognition (B Lab, n.d.).

Taken together, these standards and frameworks highlight that effective fashion governance must be multi-layered, combining regulatory authority, independent certification, management systems, participatory labour governance, science-based thresholds, data transparency, and corporate accountability. An all-encompassing governance model must therefore integrate mandatory public regulation such as that seen in the EU Circular Economy Action Plan, robust third-party verification and chain-of-custody models from standards like GOTS and OEKO-TEX®, rights-based labour protections from SA8000 and Fair Wear Foundation, process-based management systems from ISO, data and benchmarking tools inspired by the Higg Index, preventative input controls from Bluesign®, and holistic corporate governance principles from B Corporation Certification. Only by combining these complementary elements can governance address the full complexity of the fashion system and move beyond fragmented, voluntary, and often superficial approaches to sustainability

4.2 Governance Models and Frameworks in the Fashion Industry

The following analysis explores nine distinct governance and strategic models designed to facilitate the transition toward a Circular Economy (CE) within the fashion and textile industries. In this chapter, the Quantum Holistic Framework (Zafeiropoulou 2025) is treated as the overarching interpretive lens through which the eight applied governance models are analysed, compared, and positioned within a broader multi-level understanding of circular fashion governance. These frameworks begin with the Participatory Value Chain (Mahanty & Domenech, 2024), which leverages stakeholder engagement for social learning through identification and negotiation, and the Multi-Stakeholder Co-Innovation Framework (Christensen, 2021), which details how municipalities act as change agents through self-governance, provision, authority, and enabling. Moving into organizational shifts, the Dual Transition Pathways (Fischer and Pascucci, 2017) identify how firms manage material flows through either technological optimization or service-based models, while the Reference Framework for Experience-Centric Networks (Romero & Molina, 2011) guides organizations in co-creating value and innovation alongside customer communities (similarly to the Strategic Governance across the Value Chain framework by Abdelmeguid et al. 2024). Strategic oversight is provided by a holistic management framework focusing on eight core themes like technology integration and collaboration to promote circular behaviour, complemented by a Multi-Criteria Decision Model (MCDM) (Silva & Morais, 2022) that assists companies in determining which circular strategies to keep in-house versus which to outsource. Further on, the Conceptual Model for Scalability (Hultberg & Pal, 2021) utilizes a two-by-two matrix to define strategic approaches for growing circular business models, while a comprehensive eleven-stage circular model of the value chain systematically categorizes practical solutions and implementation phases across the entire product life cycle. Finally, the Circular Business Models and Retail Governance framework (Dragomir & Dumitru, 2022) uses a comprehensive circular model of the value chain to analyse and categorize the circularity solutions adopted by major players in the fast fashion sector.

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4.2.1 The Quantum Holistic Framework

The Quantum Holistic Framework treats the fashion industry as a complex, adaptive, and entangled socio-technical system, rather than a linear value chain (Zafeiropoulou 2025). Governance is understood as an emergent property arising from continuous interaction between macro, meso, and micro levels. These levels do not operate independently but co-evolve through feedback loops, observer effects, and non-linear transitions. The framework conceptualises fashion governance as a multi-level, entangled system integrating micro-level human skills and values, meso-level ecosystem coordination, and macro-level policy and regulatory structures. Governance emerges through dynamic interactions rather than linear control, with data infrastructures, human rights, and adaptive scaling mechanisms cutting across all levels. The model reflects quantum-holistic principles of superposition, entanglement, uncertainty, and tunnelling, enabling both incremental and transformative transitions toward circular, digital, and green fashion systems.

This framework (see Fig. 6 below) should be read from top to bottom and bottom to top simultaneously, rather than as a one-directional hierarchy. The boxes represent analytically distinct governance levels: macro (policy and institutions), meso (ecosystems and value-chain actors), and micro (individuals, skills, and agency), while the arrows indicate dynamic feedback loops between these levels. Downward arrows show how macro-level regulation, standards, and incentives shape organisational practices and individual behaviour by setting boundary conditions and expectations. Upward arrows show how micro-level skills, worker agency, and meso-level ecosystem practices feed back into organisational learning, standard evolution, and policy adaptation. The arrows therefore signal mutual shaping rather than control, capturing the quantum-holistic idea that governance emerges through continuous interaction, learning, and adjustment across levels, not through linear command-and-compliance alone. Bidirectional arrows between layers represent entanglement and feedback loops, showing how skills influence organisational behaviour, organisational practices reshape policy expectations, and policy changes redefine skill demand. Cross-cutting digital and data infrastructures weave through all layers, symbolising traceability, transparency, and decision intelligence. In what follows, the macro-, meso and micro levels are explained in detail.

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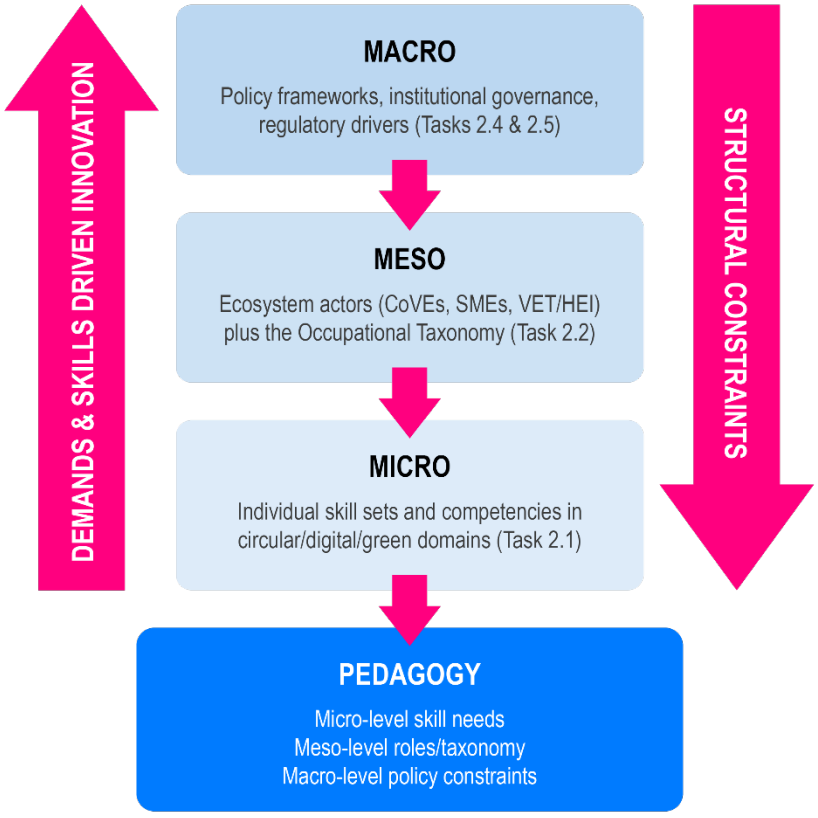
Figure 6: Conceptual Model - Quantum Holistic Framework (Zafeiropoulou 2025)



4.2.1.1 Macro Level - Policy & Institutional Governance

At the macro level, the Quantum Holistic Framework identifies the main policy, regulatory, and institutional instruments that shape the conditions for circularity in the fashion industry, as summarized in the list below.

- EU Circular Economy Action Plan (EPR, Ecodesign, DPP)
- International Standards (ISO, SA8000, GOTS, OEKO-TEX®)
- Labour, environmental & chemical regulation
- Trade and procurement policy

↓ Enforcement, incentives, boundary conditions ↑

At the macro level, governance establishes the boundary conditions within which the fashion system operates. This includes public regulation, international standards, and institutional incentives. Elements drawn from the EU Circular Economy Action Plan introduce mandatory lifecycle governance through extended producer responsibility, product durability and recyclability requirements, bans on destructive practices, and digital product passports. Global standards such as ISO, GOTS, SA8000, and OEKO-TEX® contribute internationally recognised rule systems that

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stabilise expectations across borders. From a quantum-holistic perspective, these macro frameworks do not deterministically control outcomes; instead, they shape a field of possible actions within which firms, workers, and ecosystems “collapse” into specific governance behaviours depending on context, enforcement, and cultural alignment. Institutional tunnelling is enabled when regions or organisations leapfrog incremental change by aligning regulation, incentives, and shared values.

4.2.1.2 Meso Level - Fashion Ecosystems & Value Chains

At the meso level, the Quantum Holistic Framework identifies the key actors, institutions, and governance mechanisms that coordinate circularity across fashion ecosystems and value chains, as summarized in the list below.

- Brands, SMEs, suppliers, manufacturers
- Certification bodies, auditors, NGOs, trade unions
- VET providers, HEIs, CoVEs, clusters, investors
- Governance mechanisms: collaboration, due diligence, remediation

↓ Coordination, learning, capability building ↑

The meso level is the core orchestration layer of the governance model and reflects the ecosystem logic central to ReMODE. Here, governance is enacted through networks of brands, SMEs, suppliers, VET providers, HEIs, certification bodies, NGOs, investors, and public agencies. Elements from participatory value-chain governance, Fair Wear Foundation, collaborative network models, and Bluesign® are integrated at this level. Governance is not reduced to compliance but includes co-creation, remediation, shared learning, and trust-based coordination. Relational embeddedness and network entanglement are critical: when actors are strongly connected, changes in one node (for example, new chemical restrictions or labour requirements) propagate rapidly through the system. This level also hosts occupational taxonomies, cluster governance, and Centres of Vocational Excellence, which translate macro rules into operational practices and feed real-world constraints back into policy evolution.

4.2.1.3 Micro level - Individuals, skills & Human agency

At the micro level, the Quantum Holistic Framework identifies the individual actors, skills, and forms of human agency that shape how circularity is enacted in everyday practice, as summarized in the list below.

- Workers, designers, managers, learners
- Circular, Digital & Green (CDG) skills
- Worker voice, wellbeing, ethical judgement
- Lifelong learning and micro-credentials

↑ Skill activation, practice feedback ↓

At the micro level, governance materialises in the daily decisions, skills, and identities of individuals: designers, technicians, managers, auditors, workers, and learners. Drawing from SA8000, Fair Wear, B Corp, and the Quantum-Holistic Skills Ecosystem, this level embeds humanistic

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values, worker rights, wellbeing, and continuous learning into governance itself. Individuals operate in a state of skill superposition, simultaneously holding circular, digital, and green competences that are activated as regulatory, market, or organisational signals shift. Governance here is not only about control but about enabling agency, voice, and ethical judgement. Worker grievance mechanisms, professional standards, and micro-credentials act as micro-governance instruments that influence system behaviour from the inside out.

4.2.1.4 Cross-cutting Governance Enablers (Operate Across All Levels)

Across all three levels, the Quantum Holistic Framework identifies the key cross-cutting governance enablers that support coordination, accountability, and system transformation, as summarized in the list below.

- Data, traceability & measurement (Higg Index, DPPs, ISO systems)
- Human rights & humanistic values (living wages, safe work, inclusion)
- Adaptive scaling & transformation (incremental improvement + systemic change)

Cross-cutting all three levels is data, transparency, and decision intelligence. Elements from the Higg Index, Digital Product Passports, ISO management systems, and OEKO-TEX® traceability tools provide shared measurement languages and information infrastructures. From a quantum-holistic viewpoint, these tools are not neutral: the act of measurement reshapes behaviour. Governance therefore must control how data is used, verified, and communicated, preventing greenwashing while enabling learning and benchmarking. Multi-criteria decision frameworks are essential to make trade-offs visible between environmental impact, social justice, economic viability, and scalability.

The final integrative element is adaptive scaling and transformation logic. Drawing on scalability governance models and B Corp's continuous improvement principle, the unified model distinguishes between efficiency-driven standardisation and adaptability-driven experimentation. Governance supports both incremental optimisation and transformative leaps. Quantum tunnelling occurs when aligned governance across macro, meso, and micro levels allows the system to bypass entrenched linear lock-ins, such as overproduction or exploitative sourcing, and move directly toward regenerative, circular configurations.

The unified quantum-holistic governance model positions fashion governance as a living system. Regulation provides structure, standards provide stability, ecosystems provide coordination, and individuals provide meaning and agency. Circularity, digitalisation, and sustainability emerge not from a single dominant framework but from the entangled interaction of all governance elements operating simultaneously across levels.

4.2.1.5 Practical Application

The challenge for fashion in terms of governance is not the absence of standards but rather their fragmentation. The aforementioned framework resolves that fragmentation by treating governance as relational, adaptive, and multi-level, capable of integrating voluntary and mandatory mechanisms, social and environmental priorities, and global and local realities (Zafeiropoulou 2025). It aligns directly with ReMODE's ambition to connect skills, ecosystems, and policy into a coherent transition architecture while remaining flexible enough to support cultural diversity, regional specialisation, and non-linear innovation pathways. The three governance levels of the

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Quantum Holistic Governance Framework are the foundational concept of the REMODE multi-level analytical framework used also to examine skill needs for a circular, digital, and green transition in the textile and clothing sector.

4.2.2 Participatory Value Chain

The Participatory Value Chain Framework (Mahanty & Domenech, 2024) is designed to leverage stakeholder engagement for social learning and advance the transition towards a CE, particularly across complex value chains like fashion textiles. While the sources use fashion textiles as an illustrative case study, the process-led framework is broadly applicable across various CE transition areas.

The framework provides a systematic methodology for stakeholder engagement and consists of four main components: Identify, Align, Negotiate, and Communicate (see Fig. 7). The framework's primary goal is to foster stakeholder engagement and enable social learning in CE contexts. Social learning is a process where stakeholders share a common forum, learn about each other's perspectives, reflect on their drivers and constraints, and co-create a shared vision and knowledge base concerning the CE transition.

The four components are designed to guide a participatory process:

1. **Identify:** This initial component requires defining the context, system boundary, and relevant stakeholders. The context can be set at different levels, such as material, product, sector, regional, or national. Defining the system boundary might focus on the entire value chain or only specific aspects, such as particular pathways of circulation (e.g., reduce, reuse, recycle).
2. **Align:** The next step involves aligning stakeholders on what circularity means for the defined context. This is crucial because stakeholders often have differences in understanding, perceived challenges, and solutions due to divergent goals and potentially fragmented knowledge of the overall value chain. Alignment ensures consistency and clarity in CE implementation, which helps monitor, assess, and audit operations.
3. **Negotiate:** This component focuses on the negotiation of interventions. Appropriate methods and tools (qualitative and quantitative) are selected to provide an analytical basis for the co-creation of action-oriented solutions.
4. **Communicate:** The final stage involves the communication and validation of findings. This step maintains open communication channels and allows for assessing the progress of circularity transitions and developing monitoring systems over time.

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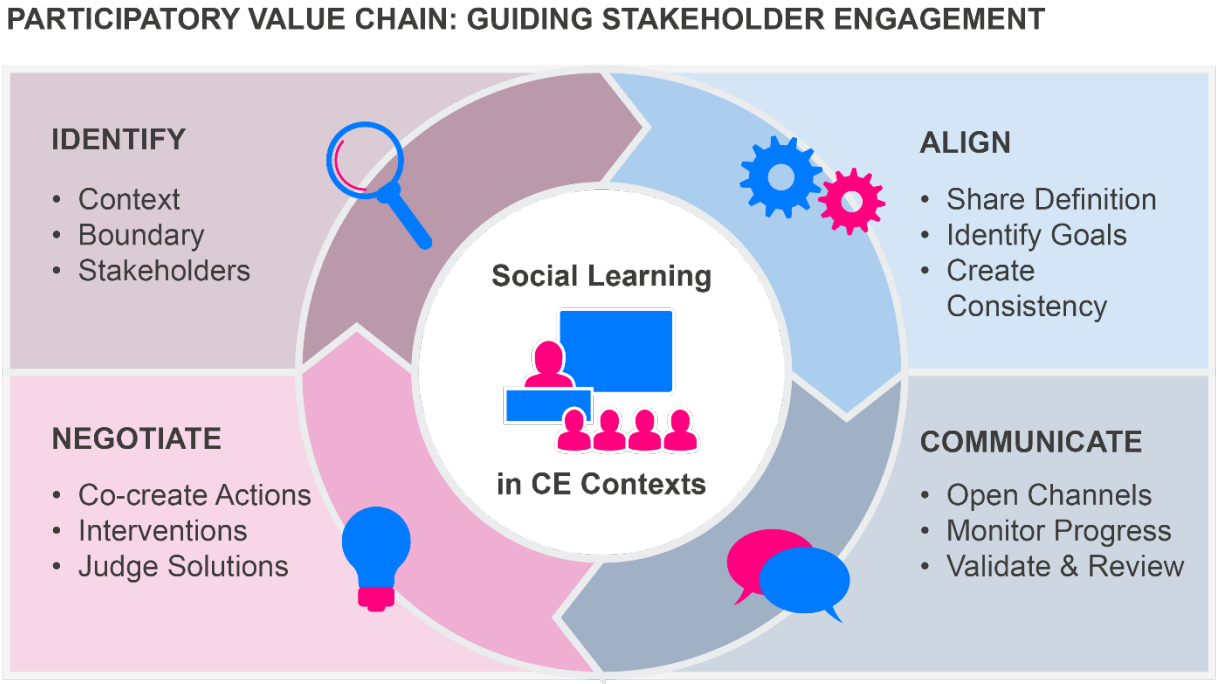
Figure 7: Participatory Value Chain Framework (based on Mahanty & Domenech, 2024)



4.2.1.1 Practical Application: Circular Fashion in London

The framework has been used in practice as the foundation for a stakeholder engagement process focused on the transition towards a CE in fashion textiles in London (Mahanty & Domenech, 2024). This project was initiated in partnership with an academic institution and a local government entity to identify key challenges and leverage areas for increasing circularity and reducing demand-based emissions in London.

The application of the framework in the London case study followed a systematic methodology comprising five detailed steps, as follows:

1. Mapping of the System Boundary and Relevant Stakeholders (Identify)
    - The system boundary was defined to encompass the entire fashion textile value chain, from raw material production (fibres) through distribution, retail, and end-of-life stages.
    - A total of 34 stakeholders participated, selected using a top-down approach to ensure representation across the entire value chain, including brands, designers, government/policy actors, academics, and consultancies.

2. Scoping of the Problem through Workshop 1 (Align)
    - The first workshop aimed to align stakeholders on the perception of the problem and establish common ground.
    - Key questions focused on defining the circular economy in the context of fashion textiles and identifying drivers and barriers to the transition.

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- A significant outcome of this “alignment” step was the practical evidence of a lack of alignment among stakeholders regarding the definition of CE and their fragmented knowledge of the overall value chain.

3. Envisioning of Solutions and Circularity Options through Workshop 2 (Negotiate)
   - The second workshop focused on identifying and prioritizing circular interventions, reflecting on their feasibility, practicality, and potential impact across the value chain.
   - Four broad areas of intervention were discussed: design, business models, reuse and recycling, and transversal strategies.
   - Stakeholders prioritized actions by qualitatively judging them based on their perceived impact versus feasibility.
   - Prioritized Interventions (High Impact and Feasibility): These included education and awareness, adoption of CE business models (like rental), promotion of second-hand markets, Extended Producer Responsibility (EPR), and supporting infrastructure for circulation.

4. Combining Stakeholder Views and Analytical Tools (Negotiate/Communicate)
   - This step involved integrating the qualitative stakeholder insights with other analytical tools to design robust solutions.
   - In the London project, this included analytical components such as Material Flow Analysis (MFA) of London’s textile flows and emission modeling to quantify greenhouse gas emissions and identify leverage points, aligning with the city’s goals.

5. Communication and Validation of Findings (Communicate)
   - Open communication channels were continuously used to share and validate findings.
   - Participants were briefed on the project status and initial findings (e.g., from MFA) before the workshops. They were also provided with summaries of discussions and offered opportunities to provide feedback through various channels. The findings were also reviewed and validated through informal conversations with experts from academia and policy.

In summary, the participatory framework acts like a multi-lens microscope, guiding diverse actors in a complex system to first agree on what they are looking at (Identify/Align), then collaboratively determine the best actions to take (Negotiate), and finally ensure those actions are accurately reflected and monitored (Communicate).

4.2.3 Multi-Stakeholder Co-Innovation Framework

The Multi-Stakeholder Co-Innovation framework (Christensen, 2021) is a typology of local governance derived from earlier research (Bulkeley and Kern, 2006), which is applied to analyse how cities and municipalities can act as change agents to support the transition toward CE.

The framework emphasizes that municipalities can combine multiple modes of governance to facilitate the closing of local material loops. The overall approach is based on an action research model, which utilizes multi-stakeholder co-innovation processes, collaborative efforts between researchers and local stakeholders to generate both scientific and socially relevant knowledge while supporting a real-world transition.

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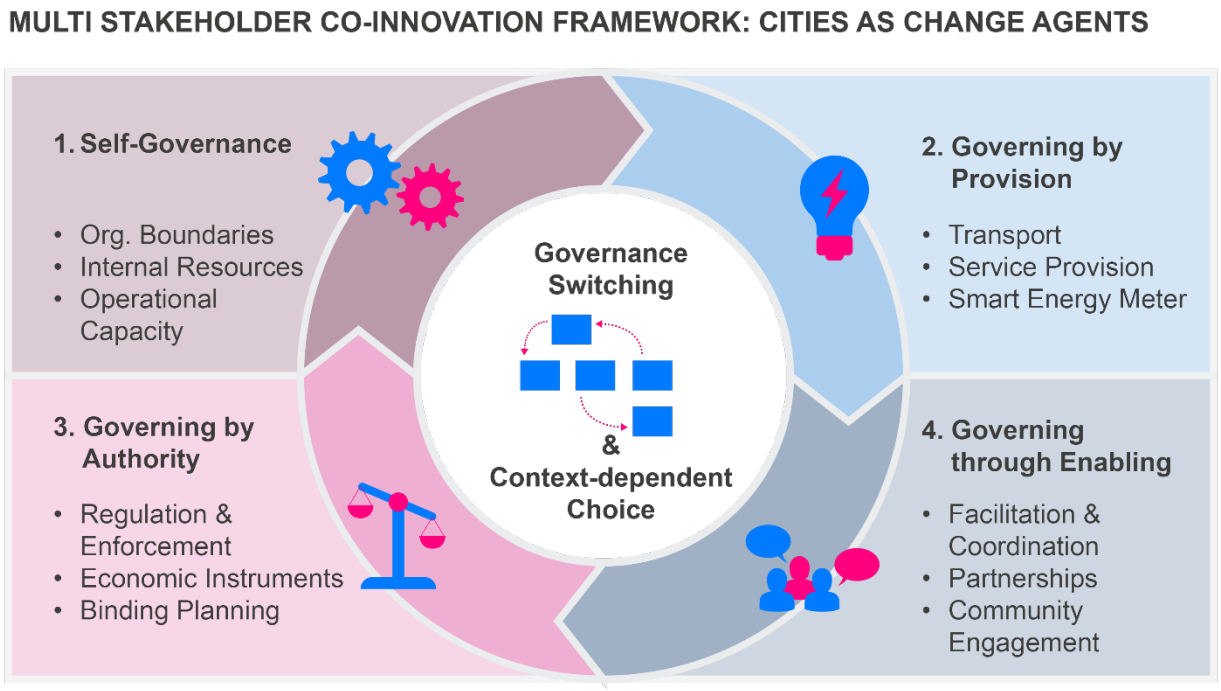
The framework identifies four main modes through which local governments can support and facilitate the CE transition (also shown as an illustration in Fig. 8) are explained in detail below:

1. **Self-governance:** This mode refers to the municipality's capacity to govern its own assets and activities. It focuses on actions taking place within the legal boundaries of the municipal organization.
2. **Governing by provision:** This involves governance through the provision of services and resources. This often happens through municipality-owned agencies and companies, such as utilities, heating companies, transport companies, and waste companies.
3. **Governing by authority:** This mode uses authority and regulation to govern. This includes rules and enforcement, direct and economic regulation (like taxes and tariffs), and legally binding planning activities that affect companies and citizens.
4. **Governing through enabling:** This encompasses governance through facilitating, coordination, collaboration, and encouraging. This can range from formal partnerships to informal community engagement.

The framework stresses that municipalities often switch between these four modes depending on the context and situation, indicating that selecting the right mode is influenced by local factors and national legislation.

Figure 8: Multi-Stakeholder Co-Innovation Framework (based on Christensen, 2021)



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4.2.2.1 Practical Application and Case Studies

The framework was applied to two in-depth case studies in Danish municipalities (Bornholm and Rødovre) that collaborated with local stakeholders, waste companies, and knowledge institutions to close material loops (Christensen, 2021).

Case Study 1: Recycling Waste Textiles

This project explored the potential for collecting and recycling waste textiles, which is crucial given the high environmental impact of the textile value chain and the need to comply with the EU Waste Framework Directive requirements for separate collection by 2025.

How the Framework was Used in Practice:

- **Governing by Authority:** Rødovre Municipality established a pilot collection scheme for used clothing and shoes, testing two different systems. This scheme was legally binding, meaning citizens covered by it were obliged to follow the instructions, illustrating governing by authority.
- **Governing by Provision/Enabling:** The municipality collaborated with the publicly owned waste company (Vestforbrændingen) and knowledge institutions. Rødovre's part ownership in the waste company provided an opportunity for governing by provision, as they explored the potential structure for a future collection scheme.
- **Co-innovation/Scenario Development:** A scenario analysis was conducted to quantify national opportunities for recycling waste textiles in Denmark, leading to the development of an “ambitious scenario” (Scenario C) that illustrated the potential of a national, closed-loop system. This quantified the potential benefits and highlighted the need for political decisions regarding the roles of private collectors (NGOs) versus municipal waste companies.
- **Outcome:** Rødovre Municipality used the findings from the collection test to establish and implement a textile collection scheme covering the entire municipality as part of their waste management plan.

Case Study 2: Recycling Construction and Demolition Waste (CDW)

This case study, focused on the island of Bornholm, aimed to bridge the gap between demolition waste and new building construction to achieve the municipality’s ambitious goal of recycling all waste fractions by 2032.

How the Framework was Used in Practice (Combination of All Four Modes):

- **Self-governance:** The municipality used its demolition fund (an asset) to financially support the demolition of worn-out houses using selective demolition techniques. This demonstrated using its own assets to influence the local construction sector.
- **Governing by Provision:** The municipality utilized its ownership relationship with the local waste company (BOFA). BOFA stored the demolished construction materials at a local facility while potential buyers were identified.
- **Governing by Authority:** The municipality employed its waste planning and waste management authority during demolition procedures, specifically requiring mandatory environmental screening prior to demolition (in accordance with Danish law).

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- **Governing through Enabling:** The municipality actively played the role of facilitator and change agent. They established a local green construction network through a series of workshops to convey knowledge, build competencies, and create collaboration between local stakeholders (demolition companies, construction companies, architects, and public authorities). They also created partnership agreements with private enterprises (e.g., a company specializing in brick recycling) to ensure materials were reused.

Conclusion on the Use of the Multi-Stakeholder Co-Innovation Framework

The primary finding across both cases is that municipalities serve as crucial change agents in the transition to a CE by strategically combining these different modes of governance. The successful implementation relied on the collaborative production of knowledge and multi-stakeholder partnerships.

This framework operates much like a conductor leading an orchestra in a city's transition to a CE. Instead of relying on just one instrument (like only setting regulations-Authority), the municipality utilizes its entire ensemble: playing its own assets (Self-governance), directing its affiliated organizations (Provision), issuing rules (Authority), and ensuring all private and knowledge-based players are harmonized and working together toward a shared goal (Enabling).

4.2.4 Institutional Incentives and Dual Transition

The Institutional Incentives and Dual Transition framework (Fischer and Pascucci, 2017) is a conceptual model that inductively defines two distinct dual transition pathways for firms collaborating in complex supply chains (specifically the Dutch textile industry) to transition toward a CE.

The framework analyses how requirements for transitioning to CE create new organizational forms in inter-firm collaborations, which subsequently stimulate the emergence of new institutions (rules that shape actors' decision-making). The framework identifies and analyses differences between these two pathways based on three key organizational elements which will be further detailed below: chain coordination, contracting, and financial mechanisms (shown as an illustration in Fig. 9).

Framework: Dual Transition Pathways

The framework posits a dichotomy between two methods that can be used to manage circular material flows and inter-firm collaborations:

1. Status Quo Arrangements (SQ) Pathway

The SQ pathway describes collaborations where organizations focus on optimizing up-cycling technologies and infrastructure.

- **Institutional Alignment:** SQ arrangements rely on existing general rules of the linear economy. They deal with the CE transition by coping with the current institutional setting.
- **Focus:** Technological improvements and managing the logistics of post-consumer materials. SQ arrangements may have implications for formal rules, such as creating a new industry standard for up-cycled fabrics.
- Key Organizational Elements (SQ):

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- **Chain Coordination:** Primarily focuses on creating new industry (quality) standards for up-cycled materials and improving post-consumer processes (like sorting infrastructure) to align suppliers and buyers.
- **Contracting:** Uses relational long-term contracts aimed at optimizing materials and technologies, often at a pre-competitive stage. Contracts are flexible and loosely set, lacking explicit output targets due to the experimental nature of optimizing processes.
- **Financial Mechanisms:** SQ arrangements, which typically involve investments in technology and machinery (like a sorting machine), can generally be financed using current financing mechanisms (asset-based financing).

2. Product as Service Arrangements (PAS) Pathway

The PAS pathway describes collaborations where the focus is on providing products in service contracts (see Fig.9 below).

- **Institutional Alignment:** PAS arrangements are characterized by self-enforcing constraints that do not rely on existing institutions. They challenge existing rules, especially concerning ownership and the distribution of incentives and risks.
- **Focus:** Reshaping ownership, increasing responsibility for materials, and facilitating cascading activities (reuse, refurbishing, leasing again) to extend product life cycles. PAS arrangements may have wider implications, such as reshaping ownership in service contracts and creating cascading supply chain activities.
- Key Organizational Elements (PAS):
  - **Chain Coordination:** Oriented toward the long-term development of collaborations to keep materials cycling, supporting the growth of demand for PAS garments. Coordination is meant to be inclusive, involving “final consumers” as “users” and aiming to shift ownership from a single supplier to the inter-firm collaboration.
  - **Contracting:** Uses relational service contracts (e.g., lease contracts) to manage products in use by customers and facilitate cascading partners. These contracts focus on sharing property and decision rights on materials to facilitate take-back systems among multiple actors.
  - **Financial Mechanisms:** Requires new financing models, specifically cash-flow-based financing and dynamic earning models, because standard financing mechanisms based on ownership of assets are not suitable for service models where ownership is shared or retained by the producer/leasing company.

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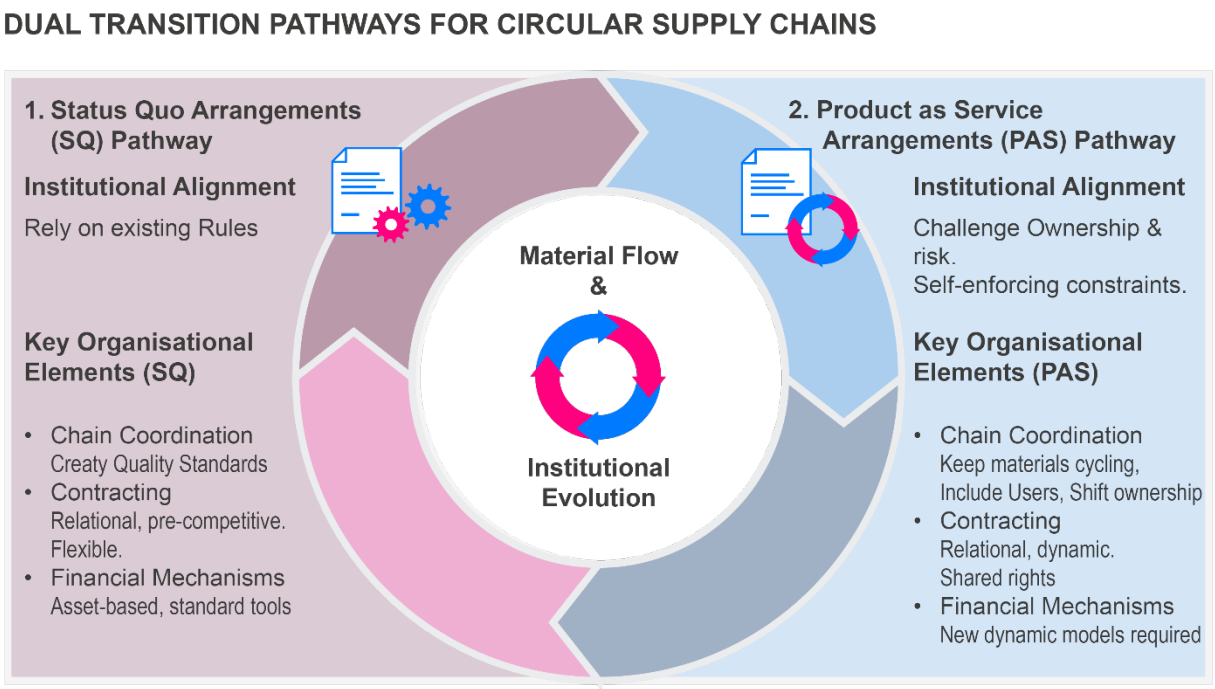
Figure 9: Institutional Incentives and Dual Transition Framework (based on Fischer & Pascucci, 2017)



4.2.3.1 Practical Application and Case Studies

The framework was applied to multiple inter-firm collaborations in the Dutch textile industry to analyse the differences in how they organize and transact circular material flows (Fischer and Pascucci, 2017).

Cases Utilizing the SQ Pathway (Optimizing Materials/Infrastructure):

- **Cradle-to-Cradle (C2C) Fashion Positive Program:** This initiative involves multiple renowned fashion companies (like Stella McCartney and G-star) collaborating upstream in the supply chain to optimize materials to meet C2C certification standards (a gold-certification level). C2C acts as a facilitator, using its revolving fund (financial mechanism) and collective bargaining power (chain coordination) to convince yarn producers and factories to change manufacturing processes. This is a transactional approach focusing on material improvement.
- **House of Denim:** Aims to set an industry-wide standard for using a small percentage (around 3%) of Post-Consumer Recycled (PCR) textiles in new fabrics. This approach focuses on collaborating with upstream actors to improve materials and push for a new standard.
- **Circle Economy Textile Sorting Project:** A consortium developing the Fibresort technology to chemically detect fibre composition in post-consumer textiles. This project addresses the chain coordination challenge of the lack of infrastructure for collecting and processing old garments, necessary to create feedstock for recycling technologies. Co-investing in the sorting machine is a key financial mechanism for this SQ project.

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Cases Utilizing the PAS Pathway (Products as a Service):

- **Mud Jeans, Lena Fashion Library, and Dutch aWEARness:** These businesses employ the PAS model, where ownership of the garment stays with the producer/provider, and the customer pays a fee (e.g., a monthly subscription or lease) for the service.
- Contracting and Ownership (PAS):
    - **Mud Jeans** utilizes lease contracts (B2C) for jeans. After use, the jeans are either sold as "vintage" (cascading activity) or shredded and up-cycled into new fabrics, ensuring the company remains responsible for the material.
    - **Dutch aWEARness** leases corporate wear (B2B) and uses a track-and-trace system to monitor the material composition and value added by chain partners. They identified that the rigid juridical system constrains the ability to formally create a desired system of shared ownership of materials across the supply chain, requiring a combination of formal and informal contracting.
- **Financial Barriers (PAS): Lena Fashion Library** experienced the key challenge of PAS financing. Banks often decline investment requests because their financing models are based on assessing ownership of assets (linear models), which clashes with the PAS model of a slow-starting, cash-flow-based revenue stream. Overcoming these barriers requires banks to adopt circular financing models based on cash flow.
- **Potential Impact (PAS):** The adoption of PAS can shift responsibility for materials to the producer/service provider, providing a strong incentive to improve product quality and longevity. If PAS arrangements achieve critical mass, they are expected to have disruptive effects that transform linear supply chains into circular supply eco-systems.

The two pathways highlight that firms can either adjust existing linear institutions (SQ) to optimize up-cycling or create new self-enforcing rules and collaboration models (PAS) to fundamentally change ownership and responsibility structures.

4.2.5 Collaborative Networks for Value Co-Creation

The Collaborative Networks for Value Co-Creation framework (Romero & Molina, 2011) is a reference framework for creating experience-centric networks (also known as interface networks). This framework is designed to formally link Collaborative Networked Organisations (CNOs) and Virtual Customer Communities (VCCs) to support Value Co-Creation and Co-Innovation in the Networking Era.

The framework serves as a synthetic structure of guidelines describing the concepts, methods, and technologies necessary for establishing and sustaining these highly interactive and collaborative networks. The reference framework is composed of eight sequential steps or elements that organizations must address to successfully integrate themselves and their customers into a co-operative value creation process (see Fig. 10).

The core idea is that competition is shifting from traditional product-centric approaches to approaches based on creating value through unique experiences together with customers. These experiences are defined by the interactions between the customer and the producer to personalize a product or service based on the customer's specific needs and context.

Here are the eight steps of the framework:

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- **Value Co-Creation Strategy Definition:** This initial step involves defining how the network of organizations intends to gain competitive advantage by jointly creating value with their customers and business allies. A strategy should configure a value co-creation system-a symbiotic business ecosystem where organizations and customers interact dynamically and reciprocally to co-produce products, services, and experiences. This strategy must be adaptable and continuously reviewed in response to market changes and evolving customer needs.
- **Co-Creators Targeting:** This involves selecting the right customers and business allies to participate in co-creation partnerships. Selection criteria for customers depend on their complementary competencies (knowledge, skills, expertise, behaviours) and their enthusiastic attitudes toward enhancing existing or co-creating new products/services. For business allies, selection depends on their complementary competencies, such as process capabilities and resource capacities, required to deliver the co-creation experience. Partnerships should be based on common interests, shared goals, and a trusting, collaborative environment.
- **Collaborative Networked Organisation Creation (CNO):** Organizations must rapidly configure themselves into goal-oriented networks, like Virtual Organisations (VOs), to respond to specific value co-creation opportunities. VOs are temporary alliances, but their effective creation requires the pre-existence of Virtual Organization Breeding Environments (VBEs), which prepare organizations for collaboration by establishing common operating principles and long-term cooperation agreements, reducing set-up times.
- **Customer Communities Creation (VCC):** This step involves promoting and facilitating the creation of Virtual Customer Communities. VCCs act as valuable forums or “real living laboratories” where customers can share experiences, discuss the quality of products/services, and offer ideas for new ones, providing crucial business intelligence. Organizations should invite the right customers, view them as advisors, focus on shared interests, and encourage open dialogue, including negative feedback.
- **Trust Building:** Trust is the essential element that holds the network together and enables dialogue and cooperation between organizations and customers. Trust building is supported by the DART building blocks:
- **Dialogue:** Encouraging shared understanding of concerns.
- **Access:** Giving customers access to the necessary knowledge, tools, and expertise to construct their own experience outcomes.
- **Risk-assessment:** Recognizing that co-creation involves risks for both sides and providing information about potential risks.
- **Transparency:** Ensuring information is transparent in the interaction processes.
- **Interaction Channels Building:** This requires constructing Experience Gateways (e.g., Web-chat, email, Face-to-Face) and interactive environments (e.g., experience rooms/sand-boxes) that provide customers with an end-to-end experience across all systems and partners in the value network. These channels must facilitate dialogue and allow customers to shape their personal experiences. New ICT-infrastructures, known as customer interaction hubs, are needed to manage distributed information and maintain a customer's unified context across multiple channels.
- **Capabilities Provisioning:** The experience-centric network acts as a solution generator by associating organizational core-competencies (via CNOs/VOs) and customer

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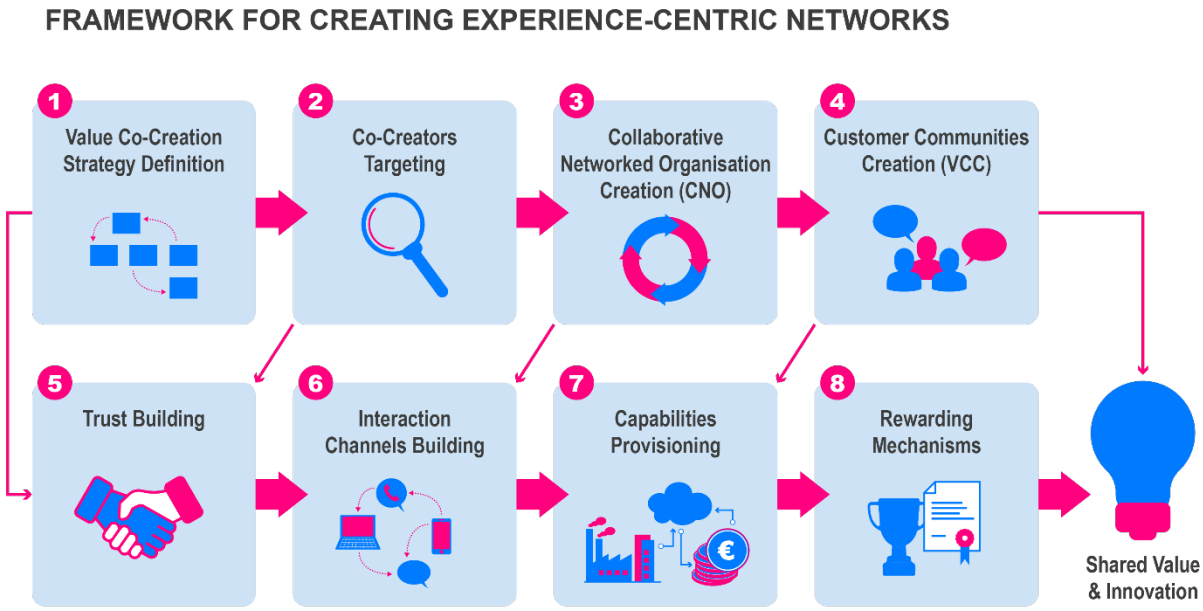
knowledge (from VCCs). CNOs allow for the rapid reconfiguration of resources into tailored value creation systems. VCCs provide information necessary for organizations to recognize future capability needs, helping VBEs recruit new business allies to support personalization.

- **Rewarding Mechanisms:** Since co-creation taps into the intellectual capital of customers, companies must acknowledge and incentivize customers for their contributions, especially for valuable ideas. Rewards can include free trials, prizes, or even sharing royalties or intellectual property in exchange for significant co-creation contributions.

Figure 10: Reference Framework for Creating Experience-Centric Networks (based on Romero & Molina, 2011)



4.2.4.1 Practical Application and Use of the Framework

The framework is a reference model and guideline for designing the necessary collaborative structures (CNOs and VCCs) to enable value co-creation. It is used to categorize and analyse eight different styles of value co-creation that organizations are currently practicing, ranging from low to high firm-customer interaction (Romero & Molina, 2011).

Examples of Co-Creation Styles Analysed by the Framework:

- **Product "Finishing" (Low Interaction):** Customers complete the value creation process by assembling a product or serving themselves (e.g., IKEA). The producer gains cost savings in manufacturing, storage, and distribution, which allows for more attractive prices to the customer.
- **New Product Design and Development (Lead-Users):** Incorporating "lead-users", customers who experience needs currently unknown to the firm, into design and testing (e.g., P&G's Connect & Develop Program). This style helps discover latent market needs and provides fresh insights, leading to highly innovative products.

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- **Existing Product Adaptation (Customer Feedback):** Using customer feedback (surveys, unsolicited comments) to continuously improve products and services (e.g., Microsoft Knowledge Base). This involves engineers and expert users solving bugs and posting solutions, guaranteeing that customers receive what they really want.
- **Mass-Customisation:** Allowing customers to co-design a standardized product within a limited set of options (e.g., Nike iD). This offers unique value efficiently and focuses on building a lasting relationship where customers customize features to fulfil particular demands.
- **Open Community Ideation and Product Design & Development:** Leveraging the "wisdom of crowds" to harvest fresh ideas for new products (e.g., LEGO Mindstorms). This openness unlocks creativity in both engineers and customers, building a richer knowledge base.
- **Personalised Experience Value and Knowledge Co-Creation (Highest Interaction):** The most advanced style, where the focus shifts from physical products to a total co-creation experience (e.g., iPod/iTunes by Apple). The firm provides interactive platforms for customers to personalize and evolve their devices, creating unique, individual experiences of value based on high-quality, ongoing dialogue.

The framework also guides the design of collaborative business models built on four pillars-Product, Multi-Stakeholder Interface, Infrastructure Management, and Financial Aspects, to ensure that value propositions are common ground between CNOs and VCCs, leading to profitable and sustainable revenue streams.

The Experience-Centric Network Framework is comparable to designing a highly advanced, custom-built theatre (the Experience Environment). Instead of just selling tickets to a fixed show (Product-Centric approach), the framework ensures the theatre company (CNOs) partners with the audience (VCCs) from the start. They jointly define what kind of show should run (Strategy), select the best actors and patrons (Targeting), set up the collaborative infrastructure (CNO/VCC Creation), ensure mutual respect and open communication (Trust Building), install multiple ways for the audience to interact with the stage (Interaction Channels), provide the unique skills and tech needed (Capabilities), and ensure everyone (actors and audience), gets compensated for their creative input (Rewarding). The result is a uniquely tailored, constantly evolving performance that maximizes value for everyone involved.

4.2.6 Strategic Governance Across the Value Chain

The Strategic Governance across the Value Chain framework (Abdelmeguid et al. 2024) serves as a comprehensive guide for the practical application of sustainable and circular practices across the fashion value chain. The development of this framework was guided by actionable recommendations derived from 10 semi-structured interviews conducted with top fashion industry decision-makers.

Framework

The framework is a holistic model designed to bridge the gap between theoretical CE concepts and practical implementation strategies in the fashion industry. It focuses on management strategies that influence behaviours related to sustainability and circularity across all stages of the value chain, aligning primarily with Sustainable Development Goal 12 (Responsible Consumption

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and Production) and Goal 4 (Quality Education), Goal 9 (Industry, Innovation, and Infrastructure) and Goal 11 (Sustainable Cities and Communities).

The framework visually situates eight core themes at the centre of the value chain (as illustrated in Fig. 11). These themes represent the foundational management practices and strategies necessary to drive sustainable and circular behaviour:

1. **Collaborations:** Partnerships with suppliers, waste management companies, and consumers are essential to minimize waste and promote circularity across the value chain.
2. **Marketing Strategies:** Focus on transparency, visual storytelling, and engaging consumers to adopt sustainable consumption behaviours.
3. **Product-related Characteristics:** Emphasizing sustainable materials, eco-friendly designs, quality, and longevity to extend product lifecycles.
4. **Education and Awareness:** Providing stakeholders with knowledge and information to address the lack of awareness that often hinders progress toward sustainability goals.
5. **Business Models:** Adopting circular business models, such as on-demand manufacturing, take-back programs, and product-as-a-service.
6. **Integration of Technology:** Utilizing advanced technologies like digital IDs for supply chain transparency, accountability, customisation, and efficient end-of-life guidance.
7. **Regulations and Legislation:** Proactively aligning with regulatory requirements and pursuing certifications to ensure compliance with ethical standards and environmental responsibility.
8. **Strategic Planning:** Integrating comprehensive planning that considers economic, social, environmental metrics, and cultural factors to ensure alignment with long-term sustainability objectives.

The framework connects these eight central management themes to specific, actionable strategies for each stage of the fashion value chain.

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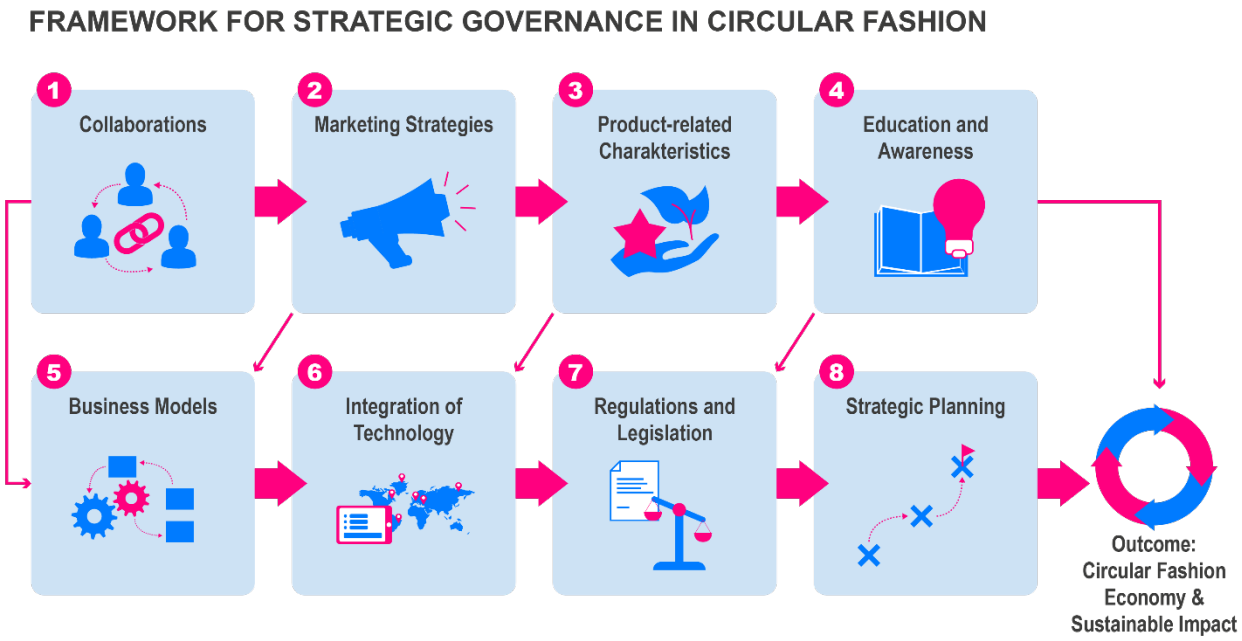
Figure 11: Strategic Governance Across the Value Chain Framework (based on Abdelmeguid et al. 2024)



4.2.5.1 Practical Application: How the Framework Can Be Used

The framework provides specific, actionable insights for researchers, practitioners, and policy-makers to promote sustainability and circularity throughout the product lifecycle. Table 5 below showcases that through different stages of the value chain (Abdelmeguid et al. 2024).

Table 5: Practical Strategies by Stages of the Value Chain

Value Chain Stage	Practical Strategies/Managerial Actions Outlined in the Framework	Supporting SDGs
Raw Material Extraction	Encourage organic/natural farming, avoid intensive farming methods, and safeguard resources to prevent soil and water contamination.	SDG 12 (Responsible Consumption and Production), SDG 15 (Life on Land)
Fibre Production	Utilize natural fibres, innovative bio-based synthetics, and NextGen materials. Produce recyclable or biodegradable materials and higher-quality yarns to reduce waste generation.	SDG 12 (Responsible Consumption and Production)

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Design	Design with circularity in mind (repair, reusability, longevity). Incorporate supplier data (location, certifications, labor standards) to support ethical sourcing. Foster innovative and customer-centric designs.	SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production)
Garment Manufacturing	Monitor and improve environmental metrics (e.g., energy efficiency, water consumption, and carbon emissions). Integrate technology like made-to-measure and on-demand manufacturing to reduce overproduction and waste.	SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action)
Distribution	Reduce carbon emissions and enhance transportation efficiency.	SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action)
Retail	Monitor sales data and purchasing patterns to reduce waste, inventory, and deadstock. Use transparent and emotionally engaging marketing strategies (like storytelling).	SDG 12 (Responsible Consumption and Production)
Consumers Use	Promote education and awareness about sustainability and circularity. Encourage a sense of responsibility and accountability for purchases. Engage consumers to gather feedback and insights.	SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production)
End-of-life	Offer end-of-life options like take-back programs, recycling initiatives, or repair and upcycling services to extend product lifecycles. Provide accessible solutions, incentives, and collaborate with waste management companies.	SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production)

Examples of Specific Strategies (Insights from top-level decision-makers):

The authors reported that the study was based on 10 semi-structured qualitative interviews with top-level decision-makers across the fashion value chain, including founders, CEOs, and managers from areas such as circular fashion, manufacturing, and recycling. The interviews aimed to identify management strategies that promote sustainability and circularity across the entire value chain. Based on the interviews and analysis, the authors identified the following main themes:

- **Technology Integration:** One business utilizes technology for an entire model revolving around made-to-measure and on-demand manufacturing, where customized design options and 3D simulations happen quickly, minimizing waste by producing only what is sold and reducing returns. This company also incorporates digital IDs into garments to ensure accountability and provide consumers with end-of-life guidance.

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- **Collaborative Design:** One company highlighted a partnership with a company that manufactures a disassembly-ready thread, a material designed to disintegrate and allow the garment to be unhinged, facilitating material recovery.
- **Business Model Innovation:** Companies are offering end-of-life options where customers can notify the company if they want their product recycled, and the organization sends an envelope for easy return. There is also mention of selling second-hand products or facilitating peer-to-peer resale platforms.

Existing Usage of the Framework:

The framework itself was developed as a result of an empirical study and represents the synthesis of managerial insights and practical implications obtained through interviews.

While the framework can be used by offering actionable guidance for industry stakeholders, and it explains that the recommendations guided the development of the framework, it is not certain whether the framework has been adopted or utilized by specific organizations or policymakers since its publication. Nevertheless, the framework provides a theoretical foundation and advocates for the continuous exploration and improvement of circularity management strategies within the fashion industry.

To exemplify it could be seen as an architectural blueprint for a sustainable circular city. Instead of just describing the vision of a circular city (the theory), the blueprint (the framework) lays out the eight central management systems (governance, technology, education, etc.) and shows exactly where and how these systems need to be implemented at every block of the city (raw materials, manufacturing, retail, disposal) to ensure a closed-loop ecosystem. The interview findings provided the key, real-world construction materials and techniques needed to draw that blueprint.

4.2.7 Multi-Criteria Governance for Waste Management

The Multi-Criteria Decision Model (Silva & Morais, 2022) is designed specifically to help textile and fashion companies manage waste by determining which circular strategies should be kept in-house (core competencies) and which should be outsourced (non-core competencies). This model is particularly relevant for companies in developing countries, where businesses often operate linearly and face difficulties implementing circular strategies without prior analysis, sometimes arbitrarily outsourcing these crucial decisions.

The model functions as a strategic guide to evaluate a company's competencies regarding circular strategies, ensuring that outsourcing decisions do not harm the company's competitiveness while advancing the principles of the CE.

The proposed model is structured into three sequential phases (as illustrated in Fig.12):

Phase I: Planning. This phase focuses on defining the decision problem from the perspective of the Decision-Maker (DM).

1. **Planning Meetings and Unstructured Interviews:** Initial meetings are held to identify key actors and gather information about the company's existing CE strategies.
2. **Cognitive Mapping:** This is a crucial step that uses computational tools to create a visual representation of the DM's thinking about the problem. The map consists of constructs

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(representing the DM's values and perceptions) connected by arrows, formulated from Primary Elements of Assessment (PEA) that lead to present poles and opposite poles (consequences of failure).

3. **Identify Criteria and Alternatives:** The collective and exhaustive analysis of the cognitive map results in the identification of the specific circular strategies (Alternatives) to be evaluated and the performance measures (Criteria) by which they will be judged.

Phase II: Evaluating. This phase ensures that the selected criteria align with the core principles of circularity and business value generation.

1. **Analyse Criteria with BSI 8001:2017:** The criteria identified in Phase 1 are evaluated using the British Standards Institute (BSI) standard 8001:2017. This standard assesses the degree to which the criteria meet six fundamental CE principles: Systems Thinking, Innovation, Stewardship, Collaboration, Value Optimization, and Transparency.
2. **Identify and Make Changes:** Based on the BSI analysis, the DM can identify and implement necessary changes in the criteria list to better align with CE objectives.

Phase III: Sorting. In this phase, the multi-criteria decision method is applied to classify the strategies.

1. **Elaborate Evaluation Matrix and Define Classes:** The DM creates an Evaluation Matrix detailing how each alternative performs against each criterion. The DM then defines pre-established classes for sorting. For this model, two main classes are used:
    - **L2 – Core Competence (Keep It In-House):** Alternatives with high potential for generating a competitive advantage through the Circular Economy.
    - **L1 – Non-core Competence (Outsourcing):** Alternatives that can be outsourced as they do not present a high potential for generating competitive advantage or risk.
2. **Apply FITradeoff: The Flexible and Interactive Tradeoff Elicitation (FITradeoff) method for the Sorting Problematic** is used to classify the alternatives into the defined classes. This method reduces the cognitive effort required of the DM by using partial information and fewer questions compared to traditional methods like AHP. It runs Linear Programming Problems (LPP) to explore the space of weights and assign alternatives based on established class limits.

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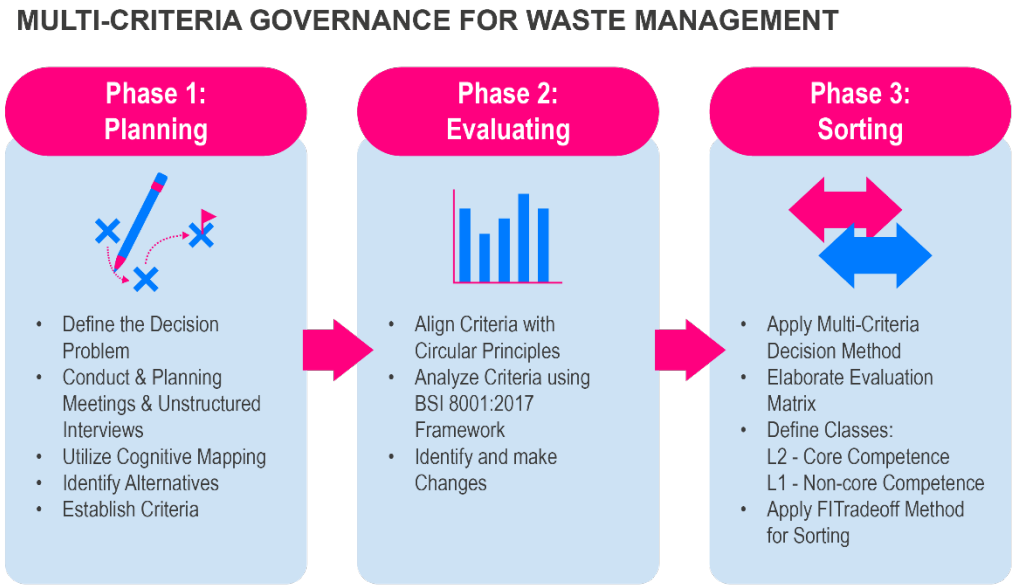
Figure 12: Multi-Criteria Governance for Waste Management Framework (based on Silva & Morais, 2022)



4.2.6.1 Practical Application and Existing Usage

The model was applied and validated through in-depth multiple individual case studies involving two real-world companies in the denim wear sector in Brazil: an Adopter company (transitioning from a linear model) and an Incumbent company (whose business is already founded on circular principles) (Silva & Morais, 2022).

Practical Insights for CE Adopters:

The comparison between the Adopter and Incumbent company results yielded six crucial insights intended to guide other transitioning companies (CE Adopters) in making better outsourcing decisions

1. **Cultural Change:** Adopters should view CE strategies as investments that yield long-term strategic gains, rather than just costs.
2. **Systems Thinking:** Managers should opt for strategies that integrate both the principles of the CE and the necessary business perspective to keep them in-house.
3. **Continuous Improvement:** Since complete transformation takes time and planning, adopters should adopt strategies step-by-step and continuously improve their circularity over time.
4. **Manager Profile:** Adopter managers should aim to develop a profile that is less prone to outsourcing core circular strategies.
5. **Indicators:** Outsourcing decisions must rely on criteria that simultaneously contemplate business, financial, environmental, and social perspectives.
6. **Alternative Streams:** Adopters should look beyond traditional waste streams (like recycling and reuse) and explore alternative streams (e.g., upcycling, donation, textile banks, Design for Environment) to maximize value recovery from waste.

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The model can be used by decision-makers from different industry sectors to evaluate their competencies, make informed outsourcing decisions, and contribute to the deployment of the CE.

This decision model can be exemplified by a sophisticated GPS system for a company trying to shift from a gas-guzzling linear route to an efficient circular highway. Instead of just picking random circular exits, the model first uses Cognitive Mapping to understand the driver's preferred speed and destination (Phase I), then cross-references the roadmap against environmental safety standards (BSI 8001:2017 in Phase II). Finally, using the FITradeoff algorithm (Phase III), it calculates exactly which parts of the journey (like core design or manufacturing) must be handled by the company's engine (kept in-house) and which non-essential services (like bulk waste hauling) can be delegated to external collaborators (outsourced), thereby guaranteeing efficiency and reducing long-term pollution.

4.2.8 Scalability and Conceptual Governance Model

The Scalability and Conceptual Governance Model (Hultberg & Pal, 2021) addresses the critical issue of the lack of scalability of Circular Business Models (CBMs), which is identified as a prime reason for the slow transition to a CE in the textile industry. The core contribution of this conceptual model provides a foundational understanding of strategies for business model scalability, specifically contextualized for CBMs in the fashion retail value chain. It emphasizes the need for a holistic view of scalability that moves beyond focusing solely on economic gains (organizational growth or increased turnover) to encompass environmental and social values, known as the triple bottom line perspective, which is crucial for CBMs.

The conceptual model is a two-by-two matrix that defines four strategic approaches to scaling business models by examining two fundamental dimensions of business model design (as shown in Table 6 below). The following two dimensions intersect to create the four strategic approaches for CBM scalability:

1. **Organizational Boundary:** Closed Business Model strategies rely on resources and capabilities within the organization's control, while Open Business Model strategies rely on boundary-spanning resources and capabilities (collaboration).
2. **Strategic Focus:** Efficiency-centred strategies aim to minimize costs and increase efficiency (exploitation), while Adaptability-centred strategies focus on responding to changing conditions, environment, and novelty (exploration).

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Table 6: Matrix for CBM Scalability

Strategic Focus	Closed Business Model (Internal Focus)	Open Business Model (External Focus/Collaboration)
Efficiency-centred	**Do it yourself** (Exploiting internal strengths)	**Divide the labour** (Exploiting external resources)
Adaptability-centred	Absorb external ideas and opportunities (Exploring internal changes)	**Create together** (Exploring external relationships)

The Four Strategic Approaches are presented below (also illustrated in Fig.13):

1. **Do it yourself (Closed & Efficiency-centred):** Focuses on using internal resources and capabilities efficiently to scale.
    - **Goal:** Exploit economy of scale and keep fixed costs low.
    - **Strategies:** Standardization of products and process routines, centralisation, automation using technology, and replication of the business model in new locations (replication requires standardization).
    - **Proposition 1:** Organizations can leverage resources and capabilities from their existing conventional business model (through centralisation, replication, standardization, and automation) for the efficient scaling of CBM activities.
2. **Absorb external ideas and opportunities (Closed & Adaptability-centred):** Focuses on being alert to changes and adapting internal resources and competencies accordingly.
    - **Goal:** Generate new learnings and opportunities for scale by integrating external information internally.
    - **Strategies:** Adapting to new legislation or social conditions, taking advantage of emerging technology, listening to and learning from customers and stakeholders, and running pilots and experiments to test ideas and gather insights. Mergers and acquisitions can also be a way to absorb competencies and scale up quickly.
    - **Proposition 2:** Organizations can create or discover opportunities for scale by actively searching for information (from industry networks or customers) or running internal pilots, and then acting on these opportunities by absorbing them into the organization.
3. **Divide the labour (Open & Efficiency-centred):** Focuses on forming strategic partnerships to increase efficiency and access resources or capabilities that would be too costly to develop in-house.
    - **Goal:** Divide labour and resources between different organizations for a more cost-efficient process.
    - **Strategies:** Strategic partnerships to access resources (e.g., local knowledge, logistics, expertise, or special equipment like sorting technology), "free-franchising" models (where partners replicate the entire model for maximum impact, not just revenue), and leveraging the work of customers (e.g., freemium models).

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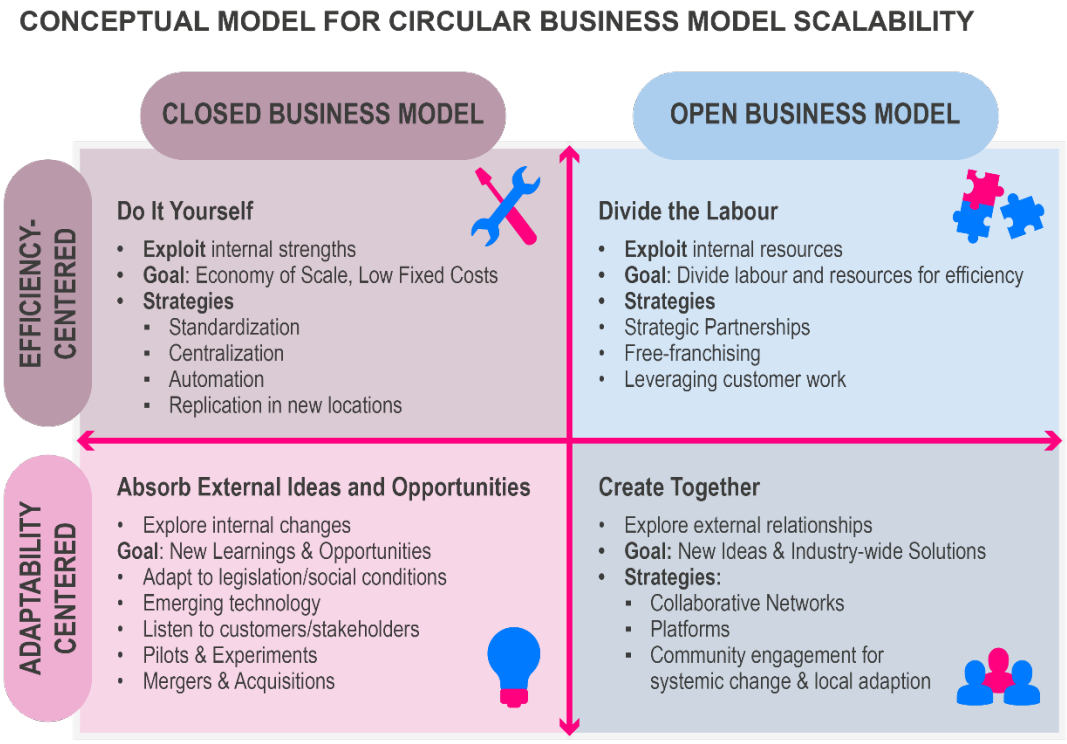
- **Proposition 3a:** Dividing the labour through partnerships is a source of business model scalability because it provides access to complementary resources and capabilities for a more cost-efficient scaling process.
- **Proposition 3b:** Organizations using this approach must carefully consider which value (economic, environmental, or social) they aim to scale, as value is distributed among partners.

4. **Create together (Open & Adaptability-centred):** Focuses on engagement and open collaboration, often letting go of some control, to explore new opportunities and create industry-wide solutions.
   - **Goal:** Generate new ideas and technologies that overcome bottlenecks for scale across the entire industry.
   - **Strategies:** Collaborative networks, platforms where customers or competitors participate in development (e.g., co-creation), and engaging with the community to ensure lasting systemic change through local adaption.
   - **Proposition 4:** Creating new ideas and technologies together in collaborative networks is a source of learning and a way to change industry conditions, which creates better conditions for scaling own CBM activities. However, this opportunity must be integrated into the permanent business model to capitalize on it.

Figure 13: Scalability and Conceptual Governance Framework (based on Hultberg & Pal, 2021)



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4.2.7.1 Practical Application and Existing Usage

The model was developed using a two-part method: a Systematic Literature Review (SLR) of 57 papers on business models and scalability, and a review of activities reported by 76 fashion retail companies involved in the “2020 Circular Fashion System Commitment”. This industry initiative's activities provided the context necessary to validate and illustrate the conceptual model. The analysis of the 76 fashion companies demonstrated how the four strategic approaches are currently being used to scale CBM activities across four main areas (Hultberg & Pal, 2021):

1. Increasing the Volume of Used Apparel Collected (Take-Back Schemes) - Companies primarily use "Do it yourself" (efficiency-centred) and "Divide the labour" (efficiency-centred) strategies.

"Do it yourself" Example: The H&M Group, Inditex, and Lindex use their existing network of stores and established logistics centres to implement and scale up garment collection schemes through replication and simplifying internal routines. H&M Group successfully scaled their scheme from a 2012 pilot to collecting over 29,000 tonnes by 2019, exceeding their goal.

"Divide the labour" Example: Esprit collaborated with an organization called Packmee to scale collection volumes, outsourcing the logistics of collecting garments from customers, which adds convenience and scales collection without requiring Esprit to reconfigure its business model or make additional investments.

2. Increasing the Volume of Used Apparel Resold: Similar to collection, efficiency-centred approaches are most prominent here.

- **“Do it yourself” Example:** Nudie Jeans scaled its resale offering by initially using its own stores and later expanding the service to its internal online store, thus building on existing retail resources.
- **“Divide the labour” Example:** Many large retailers rely on partners for resale due to the resource-heavy process of sorting (which requires expertise and specialized equipment). Inditex aims to partner with 40 local non-profit organizations and recyclers for resale, while the H&M Group uses its partnership with I:CO to resell and reuse 40-60% of collected garments. This partnership model allows the H&M Group to scale environmental impact even if the economic value of sorting is transferred to the partner.

3. Increasing the Share of Apparel Made from Recycled Post-Consumer Textile Fibres: This area is more focused on adaptability-centred approaches, reflecting the complexity and novelty involved.

- **“Absorb ideas and opportunities” Example:** Companies like Tommy Hilfiger and Bestseller focus on adaptation by changing internal routines to replace existing materials with recycled ones.
- **“Create together” Example:** Companies engage in industry-wide collaborations to find solutions. Gap Inc. and the H&M Group run research projects with the Hong Kong Research Institute of Textiles and Apparel (HKRITA) to find scalable recycling techniques. H&M’s "Looop" in-shop recycling system, stemming from this collaboration, aims to influence customer attitudes and scale environmental impact, even if the technology is licensed to the whole industry.

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4. Implementing Design Strategies for Cyclability: This area is heavily reliant on the "Absorb ideas and opportunities" approach.

- **Example:** Companies must learn and adapt their current working methods to implement design strategies for cyclability. This involves training designers on circular design principles, making customer care and repair kits available (e.g., Filippa K, Nike), and implementing scoring tools (like those used by Nike) to analyse the environmental footprint connected to design choices.

Overall, the conceptual model offers practitioners a starting point for analysing appropriate actions for their CBM initiatives. Scaling in CBMs is often episodic, driven by new learning, adaptation, and collaboration, rather than continuous growth.

4.2.9 Circular Business Models and Retail Governance

The Circular Business Models and Retail Governance framework (Dragomir & Dumitru, 2022) uses a comprehensive circular model of the value chain to analyse and categorize the circularity solutions adopted by major players in the fast fashion sector. This framework serves for gathering rich empirical evidence. The core contribution is a comprehensive circular model of the value chain that systematically assesses the implementation of CE principles across all phases of a product's life cycle.

This framework is a holistic model that defines the inputs, stages, and outputs necessary for achieving circularity in the fashion industry. It organizes circular efforts along two major flows: material and information. Table 7 below showcases this purpose along the value chain consisting of eleven stages (which are shown posteriorly in Figure 14).

Table 7: Value Chain Stages and Purpose in the Circular Model

Flow Type	Stage of the Value Chain	Purpose in the Circular Model
Material Flows	Virgin raw material extraction and processing	Focusing on sustainable and certified sourcing.
	Textile and material production	Utilizing recycled materials and implementing material/waste reduction strategies.
	Product manufacturing	Minimizing resource consumption (especially water) and production waste.
	Packaging, distribution, and retail	Reducing packaging waste, using recycled/sustainable materials, and promoting resale/repair.
	Customer use	Encouraging longer product life, reuse, repair, and educating consumers on garment care.

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	Post-consumer garment collection	Implementing take-back schemes (in-house or outsourced) to gather used items.
	Recycling fibres and materials	Reprocessing collected textiles for recycling or upcycling into new production inputs.
Information Flows	Product design	Designing products for longevity, recyclability, and repair, minimizing fabric waste, and selecting sustainable fibres.
	Auditing and certification	Enforcing strict rules and Codes of Conduct for suppliers regarding chemical use, resource use, and materials sourcing.
	Collaborations with other organizations	Partnering with NGOs, universities, and start-ups to innovate, accelerate the shift to cleaner processes, and implement collection/reuse schemes.
	Ensuring transparency and traceability	Providing stakeholders with information on fibre origins, supplier locations, environmental impact, and end-of-life options.

To categorize and compare the data provided in corporate reports, the circularity solutions mentioned for each stage are categorized into five implementation phases:

1. **Strategy and guidelines:** Documented commitments and policies (e.g., updating a Transparency Strategy).
2. **Research and development (R&D):** Efforts focused on innovation (e.g., saving material with 3D technology).
3. **Implementation at scale:** Practical, large-scale projects and initiatives impacting operations and consumer behaviour (e.g., membership schemes or collection programs).
4. **Quantitative indicators:** Specific metrics reported to measure performance (e.g., number of stores with recycling systems).
5. **Targets:** Future goals and objectives the company aims to attain (e.g., reducing packaging by 25% by 2025).

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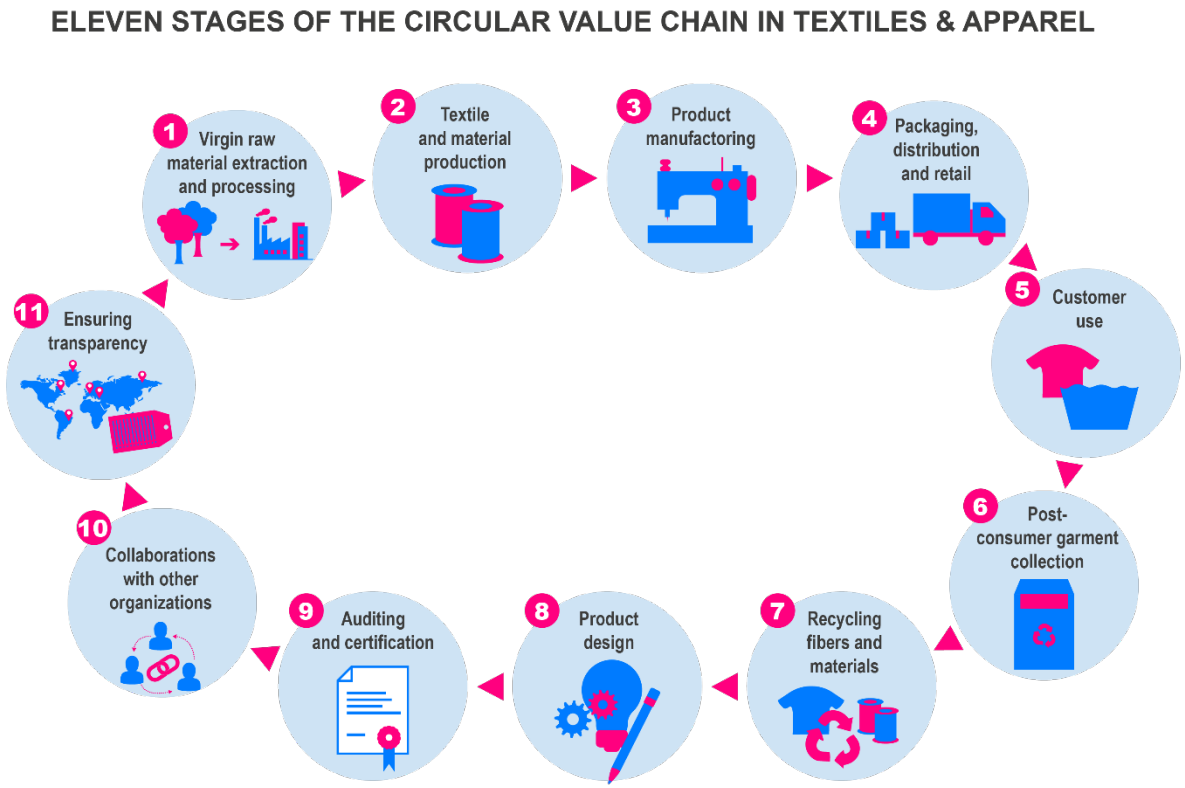
Figure 14: Circular Business Models and Retail Governance Framework (based on Dragomir & Dumitru, 2022)



The model has been used to conduct a comparative analysis of the sustainability reports of six global fast fashion retailers (H&M, Inditex, OVS, Gap inc., PVH, and VF Corp.). This application yielded rich empirical evidence regarding practical circularity solutions (Dragomir & Dumitru, 2022).

The analysis demonstrated that companies have created complex systems to reduce their environmental impact, with a focus on enforcing strict rules in the upstream supply chain and promoting recycling/reuse habits downstream.

- **Most Common Activity:** Implementation at scale was the most frequently found activity in corporate disclosures, showing that companies prioritize a pragmatic approach to circularity.
- **Most Prominent Stage:** Collaborations with other organizations was the most frequent category for the entire sample, demonstrating that circular models rely heavily on inter-organizational effort.

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4.2.8.1 Examples of Practical Solutions Implemented at Scale

The framework allowed researchers to map specific circular solutions across the value chain adopted by these major retailers:

1. **Sustainable Sourcing and Materials:** Companies report purchasing cotton through initiatives like the Better Cotton Initiative (BCI) (OVS, Gap) and using natural fibres made from low-value agricultural waste (H&M). All sampled companies adhered to Canopy's recommendations to prohibit sourcing forest-derived materials that cause the loss of endangered forests.
2. **Manufacturing and Water Management:** Retailers impose strict policies on their hundreds of suppliers. Circularity solutions here include water-saving technologies like denim wash programs (Inditex, Gap, OVS, H&M) and working toward the Zero Discharge of Hazardous Chemicals (ZDHC) standard (Gap, PVH).
3. **Auditing and Certification:** This is a crucial area for control, especially for PVH, OVS, and VF Corp.. Companies utilize third-party instruments like the Higg Index modules to assess and monitor supplier environmental performance.
4. **Collection and Recycling:** Companies have adopted product take-back and warranty programs. Inditex and H&M use their vast retail networks to install clothing collection points. H&M launched collections using Circulose, an artificial fibre derived from recycled cotton waste. PVH has launched 'Tommy for Life,' a program that cleans, repairs, and resells used items.
5. **Transparency and Traceability:** Companies are using the Higg Product Tools for lifecycle assessments and making information available to customers regarding materials, factory locations, and recycling options. Inditex developed its own Traceability Management System and promotes its 'Join Life' standard on labels to certify materials.

Comparative Usage (Different Configurations)

The model revealed that the six companies have different configurations of circularity embedded in their business models, suggesting there is no one single model:

- **Inditex and H&M:** Focused on downstream activities, emphasizing Collaborations and Packaging, distribution, and retail. They prioritized Implementation and verifiable Indicators.
- **OVS, PVH, and VF Corp.:** Primarily focused on the upstream side (Raw material extraction, Textile production, and Auditing and certification), often externalizing the implementation of circularity principles to suppliers. VF Corp. was noted for prioritizing commitments and Strategy rather than implemented results.
- **Neglected Stages:** Across almost all companies, the Customer use stage was nearly neglected, and the Product design stage received relatively little attention compared to its prominence in literature.

The framework provides a structured basis for managers to analyse circularity actions and for standard-setters (like the GRI) to improve the depth and comparability of circularity disclosures in the future.

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This comprehensive circular model can be exemplified as a high-powered microscope applied to the fast fashion supply chain. Instead of just seeing the final garment (the linear output), the microscope allows observers to systematically zoom into every tiny step from the certification of the cotton fibre (Auditing) to the partnerships creating new recycled materials (Collaborations), to see exactly where circularity is being implemented and where the "closed loop" still has gaps.

4.3 Similarities and Differences among the Nine Governance Models

Across the nine aforementioned governance models, there is a clear shared understanding of what the core problem is and why governance matters. All models assume that the fashion industry must move away from a linear system of production and consumption toward circular material flows that prioritise durability, reuse, repair, and recycling. None of the models treat circularity as something that can be achieved by a single firm acting alone. Instead, they consistently frame governance as a multi-actor challenge involving brands, suppliers, retailers, consumers, recyclers, policymakers, and intermediary organisations. Another strong commonality is lifecycle thinking: each model, either explicitly or implicitly, recognises that governance interventions must address multiple stages of the fashion value chain, from design and sourcing to use and end-of-use. Finally, all models acknowledge that the main barrier to circular fashion is not a lack of technical solutions but a lack of coordination, alignment, and decision-making structures that can handle complexity, trade-offs, and conflicting interests. What distinguishes the Quantum Holistic Framework from the other models is that it does not focus on one isolated governance function; rather, it connects governance across macro, meso, and micro levels and emphasises the dynamic interdependencies between regulation, ecosystems, and individual agency. In this sense, it operates as an integrative meta-framework that helps situate the other eight models within a broader system of circular transformation.

Where the models differ is the level of governance they prioritise and the mechanisms they consider most effective. Some focus primarily on interaction, coordination, and learning among actors *(Participatory Value Chain Framework; Multi-Stakeholder Co-Innovation Framework; Collaborative Networks for Value Co-Creation Framework).* Others focus more directly on governance across the stages of the value chain and on the managerial and strategic actions needed to embed circularity in practice *(Strategic Governance Across the Value Chain Framework; Circular Business Models and Retail Governance Framework).* A third group places stronger emphasis on institutional conditions, strategic choices, organisational incentives, and the structural factors that enable or constrain circular transition *(Institutional Incentives and Dual Transition Framework; Multi-Criteria Governance for Waste Management Framework; Scalability and Conceptual Governance Model).* The Quantum Holistic Framework brings these different levels together by explicitly linking policy and institutional structures, ecosystem coordination, and individual skills and agency within one integrated governance model. These differences are not contradictions but reflect distinct “zoom levels” within the same system. The implication is that no single governance model can adequately address the fashion industry’s challenges unless it explicitly integrates micro-, meso-, and macro-level governance dynamics.

The models also diverge in the primary governance mechanisms they rely on. Some emphasise participation, stakeholder engagement, and shared problem-framing *(Participatory Value Chain Framework; Multi-Stakeholder Co-Innovation Framework).* Others emphasise trust-building, co-

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creation, interaction channels, and collaboration between organisations and customer communities *(Collaborative Networks for Value Co-Creation Framework).* Some focus on chain coordination, contracting, financial mechanisms, and structured decision-making *(Institutional Incentives and Dual Transition Framework; Multi-Criteria Governance for Waste Management Framework).* Others foreground managerial actions such as collaboration, technology integration, strategic planning, awareness-building, and regulatory alignment *(Strategic Governance Across the Value Chain Framework; Circular Business Models and Retail Governance Framework).* The Scalability and Conceptual Governance Model focuses specifically on how circular business models can grow through efficiency, adaptability, internal capabilities, and external collaboration *(Scalability and Conceptual Governance Model).* By contrast, the Quantum Holistic Framework does not privilege one governance mechanism over another, but instead positions regulation, collaboration, measurement, human rights, learning, and adaptive transformation as interdependent governance enablers operating across all levels of the system.

Taken together, the comparison shows that the eight applied governance models each contribute a specific governance function, such as participation, co-innovation, institutional change, co-creation, value-chain management, decision support, scalability, or business model transformation, while Zafeiropoulou's (2025) Quantum Holistic Framework provides the overarching architecture through which these functions can be aligned across levels. This makes it particularly relevant for the ReMODE Governance Framework, as it offers the conceptual basis for integrating otherwise fragmented governance approaches into a coherent, human-centred, and multi-level model for circular, digital, and green transition in the fashion industry. Table 8 below summarises the nine governance models in terms of their primary governance emphasis, main mechanisms, contribution to circularity, and relevance to the Quantum Holistic Framework.

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Table 8: Comparative Summary of the Nine Governance Models and Their Contributions to Circular Fashion Governance

Framework	Primary governance emphasis	Main governance mechanism	Contribution to circularity	Relation to the Quantum Holistic Framework
Quantum Holistic Framework	Macro, meso, and micro integration	Multi-level coordination, feedback loops, cross-cutting enablers	Connects policy, ecosystems, and individual agency in one governance architecture	Serves as the overarching integrative framework
Participatory Value Chain Framework	Stakeholder alignment across the value chain	Participation, negotiation, communication, social learning	Builds shared understanding and co-created circular interventions	Strengthens meso-level coordination and participatory governance
Multi-Stakeholder Co-Innovation Framework	Local and municipal governance	Enabling, provision, authority, self-governance	Demonstrates how public actors can facilitate circular transitions through multiple governance modes	Contributes to macro–meso coordination, especially through public institutions
Institutional Incentives and Dual Transition Framework	Institutional and organisational transition	Chain coordination, contracting, financial mechanisms	Explains how firms transition through technological optimisation or product-service systems	Adds insight into meso-level institutional restructuring and transition pathways
Collaborative Networks for Value Co-Creation Framework	Inter-organisational and customer-network collaboration	Trust-building, co-creation, interaction channels, capability sharing	Shows how value can be co-created with customers and business partners	Deepens meso-level relational governance and collaborative innovation
Strategic Governance Across the Value Chain Framework	Full value-chain management	Strategic planning, technology integration, collaboration, awareness	Translates circularity into concrete managerial actions across lifecycle stages	Supports meso-level operationalisation across the value chain

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Multi-Criteria Governance for Waste Management Framework	Organisational decision-making	Multi-criteria assessment, sorting, evaluation	Helps firms decide which circular strategies to keep in-house or outsource	Supports meso-level decision intelligence and trade-off management
Scalability and Conceptual Governance Model	Business model scaling	Efficiency, adaptability, internal and external scaling strategies	Explains how circular business models can scale beyond pilots	Supports adaptive transformation across meso and macro dynamics
Circular Business Models and Retail Governance Framework	Retail and business model implementation	Circular business model design and retail governance	Connects circularity to practical implementation in market and retail settings	Strengthens meso-level application in business and consumption contexts

Following the comparison of the nine frameworks, it can be concluded that an all-encompassing governance model for the fashion industry must therefore be layered and integrative. At its foundation, it must include system scoping and participatory value-chain mapping. This involves clearly defining the context and boundaries of governance interventions, identifying relevant stakeholders, making power relations explicit, and mapping material and value flows across the lifecycle. Without this shared system understanding, governance efforts tend to fragment into isolated initiatives and symbolic actions that fail to address root causes or generate collective accountability. The model must also clearly define governance roles and capacities across public and private actors. Drawing on multi-stakeholder co-innovation approaches, it should distinguish between what can be achieved through self-governance by firms, what requires co-governance through partnerships and industry platforms, and what demands hierarchical intervention by public authorities. This role clarity is essential in fashion, where voluntary initiatives often attempt to substitute for regulation and where public infrastructure, such as collection and sorting systems, cannot be effectively delivered by market actors alone.

A third essential element is the inclusion of explicit transition pathways and incentive structures. Governance must recognise that circular transformation unfolds through both incremental improvements within the existing system and more radical, transformative changes that alter business models, institutional arrangements, and market logics. These pathways require different incentives, timelines, and risk-sharing mechanisms. Without an incentive architecture that aligns costs and benefits across actors, circular initiatives risk remaining niche experiments or producing rebound effects that undermine environmental and social goals.

Network collaboration and value co-creation form another indispensable layer of an all-encompassing governance model. Circular fashion depends heavily on behavioural change, service-based offerings such as repair and resale, and trust in information flows related to materials, impacts, and claims. These are not outcomes that can be mandated through contracts alone; they

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emerge through sustained collaboration, shared learning, and feedback loops among diverse actors, including consumers and communities. Governance must therefore provide structures that support continuous interaction, experimentation, and adaptation.

To move from intent to impact, the governance model must also incorporate concrete execution levers across the value chain. This includes governance mechanisms that translate circular ambitions into design requirements, sourcing criteria, supplier engagement strategies, marketing and communication practices, technological investments, and reverse logistics systems. Without such operationalisation, governance remains abstract and disconnected from everyday decision-making in design studios, procurement departments, factories, and retail environments. Finally, an all-encompassing fashion governance model must embed decision quality, evaluation, and scalability. Multi-criteria decision frameworks are necessary to make trade-offs transparent and to assess options against environmental, social, economic, and feasibility criteria, ideally anchored in recognised standards. At the same time, governance must explicitly address how initiatives scale, distinguishing between models that benefit from standardisation and those that require adaptability, and between open and closed system boundaries. Lifecycle-specific governance of business models, particularly at the retail and consumer interface, is crucial to ensure that circular solutions do not shift burdens elsewhere in the system.

Taken together, the nine governance models do not compete but complement one another by addressing different failure modes in the fashion system. An all-encompassing governance model must integrate participatory system mapping, multi-level role clarity, incentive-backed transition pathways, collaborative network governance, executable value-chain levers, and standards-based decision-making with explicit scaling logic. Only by combining these elements can governance in the fashion industry move beyond fragmented initiatives and support a coherent, credible, and just transition to circularity.

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5. The ReMODE Governance Framework and SMART Directives

This chapter presents the results of the 5-phased research, bringing two conceptual constructs into being: the ReMODE Governance Framework and the SMART Directives, where the latter is a direct development from the former.

5.1 The ReMODE Governance Framework

To create a coherent and comprehensive new framework for the fashion industry, we can synthesize the strengths of each of the nine models plus empirical data into a unified ReMODE Governance Framework. This framework synthesises the eight applied governance models identified in Chapter 4, while using the Quantum Holistic Framework as the multi-level conceptual lens that structures their integration across macro, meso, and micro levels. The ReMODE Governance Framework is organised into five iterative phases. These phases should not be understood as a rigid linear sequence, but as interconnected governance functions that are activated across macro, meso, and micro levels. While some phases are more strongly anchored in institutional and ecosystem coordination, others operate primarily at the level of firms, managers, skills, and operational decision-making. The framework therefore outlines not only the strategic elements and source models informing each phase, but also their primary governance-level orientation.

Phase 1: Foundation and Participatory Alignment: This phase establishes the “rules of the game” and ensures all actors are working toward a shared vision. It is anchored primarily at the meso and micro levels, where stakeholder alignment, shared understanding, and capability activation are developed, while remaining partially connected to macro-level policy and institutional framing.

Phase 2: Structural Governance and Pathway Selection: Once aligned, the organization must decide on its governing style and the economic logic it will follow. This phase is situated mainly at the macro and meso levels, where governance modes, institutional structures, and strategic pathway choices are defined, with less explicit emphasis on micro-level action.

Phase 3: Operational Integration Across the Value Chain: This phase applies specific management themes to every stage of the garment's life cycle. It operates across macro, meso, and micro levels by translating governance principles into value-chain practices, organisational coordination, and day-to-day implementation.

Phase 4: Strategic Decision-Making and Competency Mapping: In this phase, the framework determines how to execute the chosen strategies efficiently. It is primarily positioned at the micro and meso levels, focusing on organisational decision-making, capability mapping, and implementation choices, with only limited macro-level involvement.

Phase 5: Scaling and Continuous Evolution: The final phase focuses on expanding the impact of circular initiatives from local pilots to industry-wide systems. This is the most clearly cross-level phase, as it connects firm-level routines, ecosystem expansion, and the policy and institutional conditions required for long-term scaling and systemic transformation.

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Table 9 below outlines the five distinct phases of the governance lifecycle, detailing the specific constituents derived from the nine models analysed in Chapter 4. Additionally, Table 9 below provides the rationale for the inclusion of each model within its respective phase.

Table 9: Phases of REMODE Governance Framework

Phase	Strategic Element	Source	Academic & Operational Justification	Primary Governance level
1. Foundation & Participatory Alignment	Participatory Alignment (Identify & Align)	Participatory Value Chain Framework (Mahanty & Domenech, 2024)	Mitigates fragmented stakeholder knowledge; establishes system boundaries and common circularity definitions.	Meso–Micro (with partial macro anchoring)
	Experience-Centric Strategy	Collaborative Networks for Value Co-Creation Framework (Romero & Molina, 2011)	Ensures market-driven transition by shifting focus from product sales to value co-creation and customer experience.	Meso–Micro
2. Structural Governance & Pathway Selection	Multi-Mode Governance (The Four Modes)	Multi-Stakeholder Co-Innovation Framework (Christensen, 2021)	Facilitates flexibility via the "conductor" approach (Self-governance, Authority, Provision, Enabling) based on specific challenges.	Macro–Meso
	Economic Pathway Selection (SQ vs. PAS)	Institutional Incentives and Dual Transition Framework (Fischer & Pascucci, 2017)	Distinguishes between material optimization (Status Quo) and service-based models (PAS), dictating required financial and contracting mechanisms.	Macro–Meso (with selective micro implications)

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3. Operational Integration	Core Management Themes	Strategic Governance Across the Value Chain Framework (Abdelmeguid, Afy-Shararah, & Salonitis, 2024)	Embeds eight themes (e.g., Tech Integration, Marketing) across the value chain to prevent the siloing of sustainability efforts.	Macro–Meso–Micro
	11-Stage Material & Information Flow	Circular Business Models and Retail Governance Framework (Dragomir & Dumitru, 2022)	Provides a high-resolution "microscope" for tracking physical and data flows, ensuring oversight of auditing and certification.	Macro–Meso–Micro
4. Strategic Decision-Making	**Multi-Criteria Sorting** (In-house vs. Outsource)	Multi-Criteria Governance for Waste Management Framework (Silva & Morais, 2022)	Employs MCDM and Cognitive Mapping to identify “Core Competencies”, preventing arbitrary delegation of competitive advantages.	Micro–Meso (with almost no macro content)
5. Scaling & Continuous Evolution	Two-by-Two Scalability Matrix	Scalability and Conceptual Governance Model (Hultberg & Pal, 2021)	Navigates the transition from internal efficiency (DIY) to industry-wide collaboration (Create Together) to overcome scaling hurdles.	Macro–Meso–Micro
	Implementation Phase Monitoring	Circular Business Models and Retail Governance Framework (Dragomir & Dumitru, 2022)	Ensures accountability through five distinct stages (Strategy to Targets), shifting the focus from vague commitments to verifiable results.	Macro–Meso–Micro

This new framework acts as a participatory, multi-mode system that first aligns stakeholders (Model 1 - Participatory Value Chain Framework & Model 4 - Collaborative Networks for Value Co-Creation), defines the governance and economic logic (Model 2 - Multi-Stakeholder Co-Innovation Framework & Model 3 - Institutional Incentives and Dual Transition), integrates management themes across 11 stages (Model 5 - Strategic Governance Across the Value Chain Framework & Model 8 - Circular Business Models and Retail Governance), optimizes core competencies

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(Model 6 - Multi-Criteria Governance for Waste Management), and finally scales the impact through open collaboration and rigorous monitoring (Model 7 - Scalability and Conceptual Governance Framework & Model 8 - Circular Business Models and Retail Governance).

Building on the phase structure outlined in Table 9, the following Fig. 15 visualises the ReMODE Governance Framework as a concentric multi-level system that can be used as a practical guide for implementation. Rather than presenting governance as a rigid sequence of isolated steps, the model shows how the five phases are activated across the micro, meso, and macro levels, while also recognising that these levels are not equally emphasised in every phase. In practice, the figure can be used as a diagnostic and planning tool: the centre represents the integrated ReMODE framework, the rings indicate the governance levels at which action is required, and the five radial segments translate each phase into a simplified visual representation of its main macro-, meso-, and micro-level functions. This makes the model useful not only for understanding the framework conceptually, but also for identifying responsibilities, sequencing interventions, and ensuring that circular transition is supported through institutional conditions, ecosystem coordination, and firm-level decision-making with different degrees of emphasis across the five phases.

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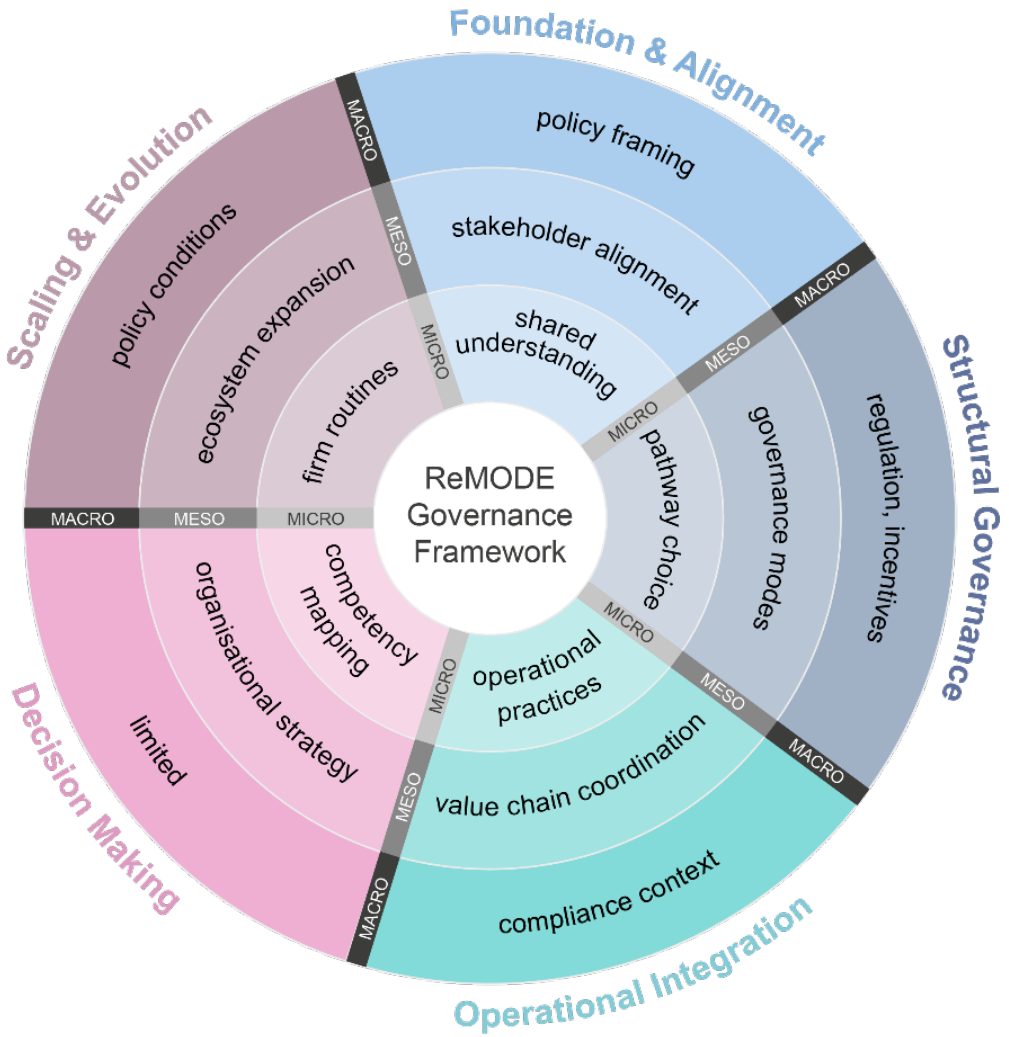
Figure 15: The ReMODE Governance Framework



While Table 9 above presents the ReMODE Governance Framework as a phased and operational structure, Table 10 below shifts the focus from phases to source frameworks. Its purpose is to show more explicitly how each governance model contributes a distinct conceptual building block to the final ReMODE Framework. In this sense, the table does not repeat the phase logic, but instead provides analytical traceability by clarifying which specific ideas, mechanisms, and governance functions are drawn from each framework and how these are incorporated into the overall synthesis (bearing in mind that the Quantum Holistic Model serves as a methodological base where all the eight models are then analysed).

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Table 10: Contribution from each Governance Model to the REMODE Governance Framework

Original Governance Model	Phase 1: Foundation & Participatory Alignment	Phase 2: Structural Governance & Pathway Selection	Phase 3: Operational Integration Across the Value Chain	Phase 4: Strategic Decision-Making & Competency Mapping	Phase 5: Scaling & Continuous Evolution
Participatory Value Chain (Mahanty & Domenech)	**Core contribution:** stakeholder identification, system boundary definition, alignment, social learning	Supporting role (inputs for governance discussions)	Indirect (informs integration priorities via stakeholder insights)	Weak (not decision-focused)	Weak (limited focus on scaling)
Multi-Mode Governance (Christensen)	Supporting role (stakeholder engagement through enabling)	**Core contribution:** authority, provision, enabling, self-governance as adaptive instruments	Supporting role (coordination across actors)	Weak (no structured decision tools)	Moderate (case-based learning and adaptation)
Institutional Dual Transition (Fischer & Pascucci)	Weak (firm-centred, limited participatory focus)	**Core contribution:** SQ vs. PAS pathways, contracting and financing logic	Supporting role (pathway-specific operational implications)	Supporting role (institutional constraints inform decisions)	Weak (no explicit scaling logic)
Experience-Centric Networks (Romero & Molina)	**Core contribution:** dialogue, trust, value co-creation with customers	Supporting role (enabling conditions for service models)	Supporting role (customer integration in operations)	Weak (no formal decision structure)	Weak (limited performance feedback logic)
Strategic Value Chain Governance (Abdelmeguid et al.)	Supporting role (education, awareness, collaboration)	Moderate (regulatory alignment influences governance choices)	**Core contribution:** eight management themes across	Weak (no explicit make-or-buy logic)	Weak (monitoring without scaling logic)

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			value-chain stages		
Multi-Criteria Governance Model (Silva & Morais)	Weak (manager-centric, not participatory)	Indirect (criteria aligned with CE principles)	Supporting role (capability focus across activities)	**Core contribution:** structured in-house vs. outsource decisions	Weak (no scaling orientation)
CBM Scalability Model (Hultberg & Pal)	Weak (assumes strategy already defined)	Weak (no governance mode focus)	Supporting role (operational implications of scaling choices)	Supporting role (learning from pilots)	**Core contribution:** efficiency vs. adaptability and open vs. closed scaling pathways
Circular Value Chain Model (Dragomir & Dumitru)	Weak (implementation-focused)	Moderate (codes, standards, compliance context)	**Core contribution:** 11-stage material and information flow mapping	Supporting role (indicators inform decisions)	**Supporting contribution:** indicators, targets, implementation phases

Whereas Table 10 explains the framework-specific contributions that inform the ReMODE Governance Framework, Table 11 below reinterprets the final framework through the macro, meso, and micro levels of governance. Its purpose is to show how the framework operates as a multi-level system by identifying the kinds of governance functions, actors, and capacities that are activated at each level. In this way, the table moves beyond source traceability and provides a higher-order synthesis of how the final framework is structured across policy and institutional conditions, ecosystem coordination, and individual skills and agency.

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Table 11: Contributions of the REMODE Governance Framework to Macro, Meso and Micro Levels

Phase	Element	Macro Level (Policy, Institutions, Industry Rules)	Meso Level (Value Chains, Networks, Lead Organizations)	Micro Level (Firms, Managers, Consumers)
Phase 1: Foundation & Participatory Alignment	Participatory Alignment (Identify & Align)	Definition of system boundaries at sectoral, regional, or national level (e.g. fashion textiles as a policy-relevant system) • Alignment with CE strategies, regulatory goals, and public sustainability agendas	Multi-stakeholder identification across the value chain (brands, suppliers, recyclers, NGOs) • Participatory workshops and focus groups to align meanings of circularity and identify shared problems	Individual organizational understanding of circularity • Managerial and expert participation in interviews and workshops to surface constraints, perceptions, and priorities
	Experience-Centric Strategy Definition	—	Configuration of collaborative networks (CNOs, VOs) that integrate firms and customer communities • Network-level agreement on value co-creation logic beyond product sales	Firm-level strategic shift toward experience and service logic • Customer participation as co-creators through communities, feedback, and interaction platforms

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Phase 2: Structural Governance & Pathway Selection	Multi-Mode Governance (Four Modes)	Public authorities selecting and combining governance modes (authority, provision, enabling, self-governance) • Legal and regulatory instruments shaping CE implementation	Lead actors (municipalities, dominant brands) acting as “conductors” and switching governance modes depending on the challenge • Formal partnerships and coordination mechanisms	—
	Pathway Selection (SQ vs. PAS)	Institutional compatibility of pathways with existing legal and financial systems • Regulatory constraints on ownership, liability, and finance	Inter-firm coordination around chosen pathway (material optimisation vs. service-based models) • Alignment of contracting and financial mechanisms across partners	Firm-level business model choice (optimize linear systems vs. redesign ownership and responsibility) • User role shift from owner to user in PAS models
Phase 3: Operational Integration Across the Value Chain	Core Management Themes	Industry standards and regulatory expectations for sustainability, reporting, and compliance	Application of eight management themes (technology, education, collaboration, marketing, business models, regulation, planning) across the value chain • Knowledge-sharing within networks	Firm-level operational practices (design for longevity, on-demand manufacturing, repair services) • Employee skills and routines influencing implementation

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	11-Stage Material & Information Flow	Institutional emphasis on transparency, traceability, auditing, and certification	Coordination of material and information flows across all 11 value chain stages • Ensuring upstream (certification) and downstream (collection, recycling) stages are integrated	Firm-level monitoring of materials, suppliers, and products • Consumer interaction with information (labels, digital IDs, end-of-life guidance)
Phase 4: Strategic Decision-Making & Competency Mapping	Multi-Criteria Sorting (In-house vs. Outsource)	—	Network awareness of strategic dependencies and shared critical capabilities	Managerial use of MCDM tools (cognitive mapping, evaluation matrices). Firm-level decisions on which circular activities are core competencies and which can be outsourced
Phase 5: Scaling & Continuous Evolution	Two-by-Two Scalability Matrix	Industry-wide diffusion through open collaboration and shared infrastructure • Policy environments enabling scaling beyond pilots	Strategic choice between closed/open and efficiency/adaptability approaches • Expansion through partnerships, platforms, and collaborative ecosystems	Firm-level scaling of pilots and routines • Managerial learning and adaptation

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Implementation Phase Monitoring	Alignment with external reporting standards and long-term targets	Network-level comparison of progress using shared indicators	Firm-level tracking across strategy, R&D, implementation, indicators, and targets • Accountability through measurable KPIs

5.2 Critical Reflection on the Scope and Limitations of the ReMODE Governance Framework

While the ReMODE Governance Framework offers a comprehensive and multi-level approach to circular transition in the fashion industry, it is important to recognise that it also has conceptual, methodological, and practical limitations. A critical reflection on these limitations helps to clarify both the scope of the framework and the areas in which further refinement or future research may be needed.

First, although the framework strongly addresses circularity in relation to traceability, recovery, recycling, design-for-disassembly, and value-chain coordination, it gives far less explicit attention to biological cycles than to technical ones. As discussed in Section 4.1, CE principles distinguish between technical materials, which circulate through industrial recovery systems, and biological nutrients, which should safely return to ecosystems. The ReMODE framework clearly supports the governance of technical loops, but it does not foreground how biological materials should be governed differently, nor does it differentiate governance arrangements for technical and biological cycles to the same extent. In this sense, the framework is more strongly developed as an industrial-loop governance model than as a fully bio-circular one. A related limitation is that the framework only partially incorporates the stronger Cradle to Cradle principles outlined in Section 4.1. Waste-as-resource is present indirectly through repair, sorting, recycling, and redesign, but renewable energy is not yet a central governance pillar, and diversity is addressed more in terms of regional flexibility and ecosystem variation than as an explicit design principle. Thus, if CE is interpreted in its more regenerative and eco-effective sense, the framework addresses it only selectively. Finally, the framework is more concerned with governing transition than with confronting the deeper CE question of absolute reduction in material throughput and overproduction. While it supports better coordination, transparency, and circular implementation within the existing system, it is less explicit on how governance should challenge the scale logic of fashion production and consumption itself.

Second, the framework also has methodological and practical limitations. Although it is informed by empirical findings from SMEs across five national contexts, it remains primarily a conceptual and synthesis-based framework, and its long-term effectiveness has not yet been tested through longitudinal implementation in different organisational or regional settings. The empirical evidence used to inform the framework is valuable, but it is based on a relatively small and non-probabilistic

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sample, which means the findings should be interpreted as indicative rather than statistically representative of the wider fashion and textile sector. In addition, the ReMODE framework may prove demanding for micro and small enterprises with limited financial, human, and technical resources. Its multi-level design is a conceptual strength, but in practice implementation may require phased adoption, intermediary support, and enabling public or cluster-based infrastructures. Finally, because the framework integrates macro, meso, and micro levels, it risks creating analytical richness at the expense of operational simplicity unless roles, responsibilities, and implementation pathways are clearly specified. These limitations do not weaken the value of the framework, but they do indicate that ReMODE should be understood as a robust and adaptable foundation for circular governance, one that will benefit from future testing, refinement, and contextual adaptation.

5.3 Translating the ReMODE Governance Framework into SMART Directives

The ReMODE Governance Framework incorporates SMART directives (Strategic, Measurable, Achievable, Relevant, and Time-bound) across its five phases. By analysing the integration of the eight governance frameworks, it enables a structured, goal-oriented approach for governance enhancement within organizations or industries. Below is how each phase of the framework connects to the SMART criteria to ensure effective governance at macro, meso, and micro levels.

Phase 1: Foundation & Participatory Alignment

- **Strategic**: This phase ensures that all actors in the system share a common understanding of circularity by aligning diverse stakeholders (from brands to NGOs) around a unified CE vision. Establishing clear goals upfront helps direct long-term strategic efforts.
- **Measurable**: The alignment of stakeholders is measured through participatory workshops and feedback loops, assessing stakeholder understanding of system boundaries and the degree of agreement on shared definitions of circularity.
- **Achievable**: By engaging key stakeholders early, the phase ensures that the alignment is realistic and feasible, with clear milestones for progressing through the transition.
- **Relevant**: This phase is highly relevant as it sets the foundation for addressing critical governance issues, fragmented knowledge and lack of shared understanding within the fashion industry.
- **Time-bound**: Time-based goals are set for aligning stakeholders (e.g., 6-month workshops) to ensure momentum and avoid delays in the transition.

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Phase 2: Structural Governance & Pathway Selection

- **Strategic**: This phase involves choosing the governance approach (self-governance, authority, provision, enabling) and deciding on the economic pathway (SQ vs PAS). It ensures that the organization's governance structure aligns with long-term sustainability goals.
- **Measurable**: The phase is measured through the assessment of pathway selection, such as determining the proportion of stakeholders adopting a Product-as-a-Service (PAS) model versus optimizing linear supply chains (SQ).
- **Achievable**: The selection of pathways considers feasibility based on regulatory, economic, and operational constraints, ensuring that the chosen model can be practically implemented.
- **Relevant**: Governance models selected (SQ vs PAS) must be relevant to the industry's needs for sustainability. For instance, PAS models are increasingly pertinent due to shifts in consumer expectations and regulatory requirements.
- **Time-bound**: Clear timeframes (e.g., 12 months) are set for making final decisions on governance structures and pathways, aligning the transition with industry timelines for regulatory compliance.

Phase 3: Operational Integration Across the Value Chain

- **Strategic**: This phase ensures that key management themes (e.g., technology integration, marketing strategies) are embedded at each value chain stage. It aligns operational decisions with the strategic goal of circularity.
- **Measurable**: Performance indicators are established for each stage (e.g., material efficiency, recycling rates) to track progress across the entire supply chain.
- **Achievable**: The integration of operational strategies is grounded in practical actions and realistic timelines (e.g., implementing repair services within 18 months).
- **Relevant**: This phase is critical because it addresses the need for coherent actions across the value chain, ensuring that sustainability becomes a part of core business operations and is not left to isolated departments.
- **Time-bound**: The operational integration is driven by time-bound milestones to ensure that each theme (e.g., technology integration) is implemented within a specified period, such as by the end of the second fiscal year.

Phase 4: Strategic Decision-Making & Competency Mapping

- **Strategic**: This phase involves mapping competencies within the organization and deciding which circular activities should remain in-house versus being outsourced. It ensures alignment with the organization's strategic capabilities.
- **Measurable**: The criteria for sorting activities into core or non-core competencies are explicitly defined. Measurable outcomes are used to track success, such as increased efficiency or reduced operational costs in core areas.
- **Achievable**: Decisions on core vs. non-core competencies are based on realistic assessments of organizational capacity and resource availability.
- **Relevant**: Ensuring that core competencies align with the broader CE strategy is relevant to avoiding fragmentation in efforts and ensuring that critical activities remain under control.

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- **Time-bound**: A timeline is set for competency mapping (e.g., 6 months), ensuring the decision-making process is completed promptly and can inform the next phases.

Phase 5: Scaling & Continuous Evolution

- **Strategic**: This phase determines how the CE models can be scaled up from pilot projects to industry-wide systems. The strategic focus is on ensuring broad adoption and industry transformation.
- **Measurable**: The scaling process is measured through quantitative indicators (e.g., number of industry-wide collaborations, reduction in waste) to track the success and spread of circular models.
- **Achievable**: Scaling is made achievable through the use of the two-by-two scalability matrix, which helps prioritize efforts based on efficiency and adaptability.
- **Relevant**: The relevance of this phase lies in its capacity to expand successful models across the industry, driving widespread adoption and ensuring that pilot projects are not isolated.
- **Time-bound**: Scaling efforts are time-bound with clear implementation phase monitoring that ensures long-term success by setting up measurable KPIs within defined periods (e.g., 12 months for pilot scaling).

5.4 Critical Reflection on the Scope and Limitations of the SMART Directives

While the ReMODE SMART Directives are intended to make the governance framework more actionable, their use also involves important limitations that should be acknowledged. Their main strength lies in translating broad governance ambitions into more specific, measurable, and implementable guidance. At the same time, however, this operationalisation creates a risk of over-standardising processes that are in reality complex, iterative, and context-dependent. Circular transition in the fashion industry does not always follow a linear path, and not all governance challenges can be reduced to predefined targets, timelines, or indicators.

A first limitation is that not all meaningful governance outcomes are easily measurable. Changes such as trust-building, stakeholder commitment, worker voice, ethical judgement, organizational learning, and the quality of collaboration across ecosystems are highly important for circular transition. Yet, they do not always lend themselves to straightforward SMART evaluation. A second limitation is that the directives may place a disproportionate burden on SMEs, particularly those with limited staff capacity, weak data systems, or low governance maturity. In such contexts, implementation may require external support, phased uptake, or simplified application pathways.

A further limitation is that the SMART Directives should not be understood as universally applicable in the same way across all regional and organisational settings. Their relevance and feasibility depend on differences in regulatory pressure, institutional infrastructure, market readiness, and existing organisational capabilities. For this reason, they are better understood as adaptive guidance than as a fixed checklist.

Finally, there is a risk that organisations may adopt the directives primarily as compliance tools rather than as instruments of deeper transformation. If applied too narrowly, the directives could

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support reporting and procedural conformity without necessarily challenging underlying practices of overproduction, weak circular design, or insufficient stakeholder inclusion. For this reason, the SMART Directives are most effective when used as enabling instruments within a broader culture of reflexive, participatory, and context-sensitive governance.

5.5. Conclusion

This report has examined how governance can support the transition of the fashion and textile industry from a linear to a circular, digital, and green system. Drawing on Zafeiropoulou's (2025) Quantum Holistic Framework, the analysis combined international standards, governance models, and empirical findings from 107 SMEs across five countries to develop the ReMODE Governance Framework as a multi-level and practice-oriented response to the sector's current challenges. The findings showed that while awareness of circularity and regulation is increasing, implementation remains uneven. Across all national contexts, SMEs continue to face fragmented lifecycle data collection, inconsistent supplier engagement, and significant skills gaps, particularly in relation to legal compliance, Digital Product Passports, traceability, and system-level coordination. At the same time, the empirical results confirmed a shared strategic direction centred on circular design, digital traceability, and policy-driven transformation, demonstrating both the urgency and the potential for coordinated governance action.

A central contribution of the report is therefore the development of the ReMODE SMART Directives, which translate this broader governance framework into a more operational and decision-oriented set of recommendations. In line with the project's objectives, these directives build on regional knowledge, existing governance practices, and the potential for public-private partnerships in order to identify synergies and co-create skills ecosystems for strategic development. Their purpose is to enhance governance implementation by making it more specific, actionable, and adaptable to organisational realities. In particular, the SMART Directives are designed to support decision-making processes, strengthen compliance with regulatory requirements, and foster ethical and responsible management practices. They also include practical guidance on the roles and responsibilities of board members, stakeholder engagement strategies, and performance evaluation methods. Taken together, this comprehensive approach provides organisations with a governance model that is not only robust, but also capable of adapting to changing business environments, regulatory demands, and stakeholder expectations. In this sense, the ReMODE Governance Framework and its SMART Directives do not simply offer a conceptual contribution; they provide a practical pathway for improving organisational outcomes, strengthening sustainability performance, and advancing the long-term circular transformation of the fashion industry.

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