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Organizational Capabilities in Circular Technology Innovation in Textile Ecosystems

Abstract

My thesis investigates how organizational capabilities, and institutional structures influence the circularity innovation strategies (CIS) of supplier firms in the textile industry. It addresses two research questions: (1) How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations (CTIs)? and (2) How do institutional structures influence circularity innovation strategies within textile ecosystems? Using a comparative case study of DBL Textiles in Bangladesh and Fibertex Personal Care in Denmark, I show that CTI adoption is not solely a function of firm-level intent or technical capacity but emerges through the complementarity between organizational institutional structures and organizational capabilities. The findings demonstrate that organizational institutional conditions shape how firms coordinate, learn, and reconfigure, which further plays a role in which type of innovation strategy the firm pursues, and that buyer firms can play a role in enabling capability upgrading in supplier firms. The thesis extends Whitley's innovation strategy typology by introducing institutional complementarity as a mediating force and by proposing buyer-enabled capability upgrading as a dynamic mechanism for strategic transformation. It concludes that CIS is not a static function of institutional fit but can evolve through inter-firm support within global supply chains.

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1. Introduction:

Recently, rising consumer concern and mounting policy pressure, most notably from the EU, have put the global textile industry under intense environmental scrutiny (Harrison et al., 2005; European Commission, 2023; Krasodomska et al., 2023). The global textile industry generates an estimated 1.3 trillion USD per year yet simultaneously consumes between 20 to 200 trillion litres of water, releases 190,000 tons of microplastics into the oceans and emits 1.2 billion tons of greenhouse gases annually (Ellen MacArthur Foundation, 2020; Chen et al., 2022; Savage, 2022; Abdelmeguid et al., 2022; Sahimaa, et al., 2024; Rana & Whitfield, 2024). While restrictive policies and punishments for environmentally harmful behavior are enforced by regulatory bodies, and NGOs encourage manufacturers to control such activities and reduce their adverse environmental impact, these new sets of 'rules' have created new market opportunities for manufacturers (Porter & van der Linde, 1995; Haleem et al., 2023). This behavior has led to a boom in research regarding how firms can still remain competitive despite regulatory pressure regarding environmental issues (James, 1997; Dangelico et al., 2017). Increasingly, a transition towards a circular economy (CE) has been promoted as a potential solution for businesses due to reducing the number of pollutants that are released into the environment, as well as decreasing water consumption and increasing revenue (Ellen MacArthur Foundation, 2020; Boje & Rana, 2021).

However, scholarship on the CE transition, in particular across international business, in particular innovation ecosystems research, offers little insight into how such technology choices unfold. Prior work emphasizes resource savings and revenue gains (Schroeder et al., 2019; Bocken et al., 2022), CE-oriented business models and capabilities, as well as upstream and downstream waste production (Geissdoerfer et al., 2017, 2018; Boje & Rana, 2021; Rana & Tajuddin, 2021; Rana & Whitfield, 2024), and transition innovation management (Hopkinson et al., 2018; Hazen et al., 2021), eco-design of products and processes (Suchek et al., 2021; Ritzen & Sandström, 2017) as well as transition barriers (Sandvik & Stubbs, 2019; Hofman et al., 2020; Kirchherr et al., 2018). Extant studies have overlooked the role of organizational capabilities, which are typically shaped by informal institutions in particular organizational routines, authority sharing, and resource allocations that underpin the firm's decisions regarding internal innovation or external acquiring of technological innovation in the CE

transition. Thus, my study aims to examine how informal institutional structures in the organization influence CTIs within textile ecosystems. Using a comparative case study of two suppliers embedded in two institutional systems, DBL Textiles in Bangladesh and Fibertex Personal Care A/S in Denmark which supply textile products to the EU and US brands, my thesis focuses upon the impact of organizational capabilities in CTI for pre-consumer waste circularity, and thus how organizational institutional structures influence particular strategies for circular innovation.

Knowledge from this research would help both suppliers and buyers to gain insights into adopting specific organizational culture and innovation strategies in circular transition in international business.

Within the textile ecosystem, production broadly falls into two categories: fashion and non-fashion. Each includes fiber types such as knit, woven, and non-woven. While my case studies span both fashion and non-fashion sectors, specifically focusing on woven and non-woven textiles, the comparison is particularly valuable as both cases face similar organizational and market challenges. This allows for a deeper exploration of how firms differ in their organizational routines and authority-sharing practices when addressing waste circularity and driving product innovation as part of the CE transition and competitiveness agenda.

Textile production generates two main types of waste: pre-consumer waste, produced during the Cutting-Trimming-Making (CTM) phase, and post-production waste, which arises when a finished product reaches the end of its usable life and is discarded (Rana & Whitfield, 2024). While both woven and non-woven textiles generate these waste types, the nature and characteristics of the waste differ significantly between them.

For instance, in the case of non-woven fabric, as the primary material used is polypropylene granules, a type of plastic, which allow for straightforward melt-reprocessing of pre-consumer waste, where plastic scraps can be re-fed into extrusion lines with minimal sorting. On the other hand, woven and knit textiles, and especially cotton-rich blends used in fashion, pose far greater complexity. They typically have color variation, fiber blends, and chemical finishes that demand multi-stage mechanical or chemical recycling (Juanga-Labayen et al., 2022) and raise logistics costs because waste streams are heavier and heterogeneous. These issues are further compounded by a lack of municipality-brand coordination, while politically backed thugs control informal

largescale pre-consumer waste streams, leading to a lack of feedstock for developing chemical means of recycling textiles (Rana & Whitfield, 2024).

Furthermore, although many startups have emerged to close the loop on different types of fabrics, existing studies have primarily focused either on the financial scalability of the resulting products (Dangelico et al., 2017; Whitfield & Maile, 2024) or on how innovation ecosystems evolve through complementarities and interdependencies among actors (Pujari, 2006; Dangelico & Pujari, 2010; Chen & Chang, 2013; Dangelico et al., 2013; Shu et al., 2017).

CTI furthermore incurs a significant financial cost, and the lack of supportive institutional structures, alongside unpredictable market demand means that developing innovations within the firm may be more difficult (Sousa-Zomer et al., 2018; Bui et al., 2020; Kumar et al., 2021). Such institutional asymmetries mean that the "same" CE transition attempts translate into very different innovation problems across both woven and non-woven fabrics, that firms must match with distinct organizational capability.

This highlights how studies have focused on the value proposition and value co-creation within CTI ecosystems. Mainstream literature has ignored how firm-specific organizational capabilities can influence its decision on whether to innovate internally or by externally acquiring innovation technologies. In order to build the background for this understanding, it is necessary to discuss how firms structure their organizational capabilities in distinct institutional contexts.

In 1992, Chandler had identified that for the firm to come into existence, its managers needed to learn first (Chandler, 1992). This learning process came in the way of learning the production, marketing and development processes as well as scaling economies, from learning the need to coordinate the various modules of production from a managerial standpoint, and finally learning from taking strategic action against competitors, or taking strategic reactions due to competitor strategies. These ideas were further developed by Whitley (2003), where he argued that the degree of authority-sharing within firms decided how organizational capabilities, which are the firm's capabilities of coordinating processes, learning about market externalities and reconfiguring organizational processes, structured through different institutional contexts, which further influenced which industries the firm would be suitable for.

This argument can be further extended to innovation strategies, where the institutional structuring of knowledge creation and codification plays a critical role in mediating the nature of capabilities firms develop and maintain. For example, firms with a higher degree of managerial control would prefer to acquire or form a partnership with an external firm which they can control (Whitley, 2000, 2003). On the other hand, firms that have a higher degree of authority-sharing with managers tend to structure their learning capabilities in a specific way so as to be ready to innovate internally (Whitley, 2000, 2003). However, the mechanism through which this happens is not well-understood within organizational capability literature, nor are the organizational institutional configurations that lead to the adoption of specific circular innovation strategies (CIS) and even whether CTI is incentivized or not in the textile ecosystem.

My thesis addresses this gap in understanding how organizational capabilities, shaped by institutional structures, influence firms' decisions to develop or acquire CTIs within textile ecosystems. It examines how organizational institutional structures, such as authority sharing, careers and regulations, affect coordination, learning, and reconfigurability. By introducing an institutional lens to ecosystem theory, my study contributes to both ecosystem and circular innovation literature, offering insights for policymakers and practitioners. The research questions are as follows:

A. How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations in the textile industry?
B. How do organizational institutional structures influence circularity innovation strategies within textiles ecosystems?

By answering these two questions, my thesis will contribute to IB, ecosystem and organizational capabilities literature.

My thesis is structured as follows. First, the literature review outlines key concepts and presents the theoretical framework used for interviews and analysis. Second, the methodology details the research design, data collection, and analysis approach. Third, the analysis and results section present the findings. Fourth, the discussion interprets these findings in the context of circular textile ecosystems and extends the literature. Finally, the conclusion summarizes the thesis and addresses its limitations.

2. Literature Review

The literature review section is structured as follows. First, I discuss organizational capabilities and their influence on firms' strategic decisions. Second, I examine how CTIs emerge within textile ecosystems. Third, I explore how institutional structures shape innovation strategies. Finally, I synthesize these insights into a conceptual framework that guides my thesis analysis.

2.1 Organizational capabilities' influence on firms' strategic decisions

Organizational capabilities can be defined as the practiced routines and hierarchical structures that enable a firm to produce, market, and develop new products (Whitley, 2003; Chandler, 1992). These routines, as relating to coordinating production, responding to competitors, or managing distribution, are shaped by the firm's internal structure and the external institutional environment in which it operates. In the context of a CE transition, these capabilities may include specific routines like "hand-sorting by color" or "IR-based fabric tracking," which influence which recycling or reuse technologies a firm can realistically absorb and scale. From this perspective, organizational capabilities reflect how firms coordinate, learn from, and reconfigure their operations to adopt specific circular innovations.

To understand how these capabilities develop and vary across firms, it is essential to examine the institutional and historical contexts in which they emerge. Institutional structures shape the way firms learn, share authority, and structure careers, factors that directly influence the configuration of organizational capabilities (Whitley, 2003).

Chandler (1992) illustrated this point by comparing the post-WWII economic trajectories of Japan, Germany, and the Soviet Union. While Japan and Germany successfully revitalized their economies through capitalist systems that promoted bottom-up learning and shared managerial coordination, the Soviet Union's centralized planning model failed to cultivate such capabilities. This contrast highlighted how organizational structure plays a critical role in economic performance, giving rise to the idea that firms better attuned to learning from their market context are more likely to capture or create value. This, in turn, led to the emergence of organizational

capability theory, where firm structures are understood as institutionally embedded and reflective of broader systemic logics (Whitley, 2000, 2003).

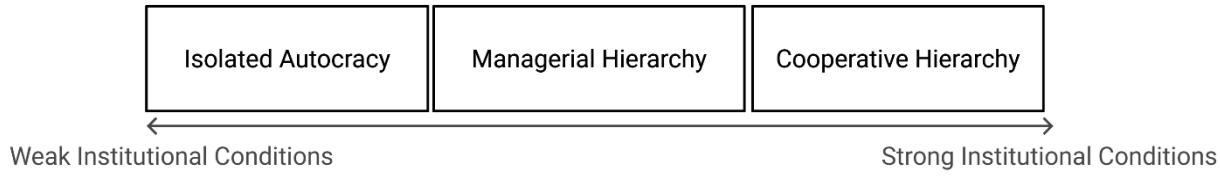
These ideas were further advanced by Dunning & Lundan (2010), who argued that multinational enterprises (MNEs) draw on institutional resources to shape specific configurations of organizational capabilities. In CE transitions, such institutional structuring determines whether a firm can, for example, prototype enzymatic cotton recycling in-house or must instead license the technology from an external specialist (Varnaitė-Žuravliova & Baltušnikaitė-Guzaitienė, 2024).

A particularly influential typology of organizational capability configurations comes from Whitley (2003), who identified three firm types based on how authority is shared and how organizational careers are structured:

- Isolated Autocracies are highly centralized firms. They are flexible and opportunistic but tend to lack deep capability development.
- Managerial Hierarchies emphasize coordination and structured learning but may be less adaptable and slower at cross-boundary innovation.
- Cooperative Hierarchies feature extensive authority-sharing and long-term organizational careers, enabling deep collective learning and strong innovation capacity.

The following figure represents my understanding of Whitley's typology, showing how institutional conditions shape firm structures through their organizational capabilities.

Figure 1: Typology of firms shaped by institutionally derived organizational capabilities



Source: Adapted from Whitley (2003)

Whitley presents the three types of firms as a spectrum rather than a continuum of evolution of firms, where the degree of authority sharing and the length of organizational careers are collectively referred to as 'institutional conditions'. When moving from weak institutional conditions to strong institutional conditions, for example moving from contexts where there is low

authority sharing to that of a higher degree of authority sharing, the types of firms that are typically present in such condition's changes. Isolated autocracies are slowly replaced by the appearance of more managerial hierarchies and going even further to contexts where authority sharing is the norm, cooperative hierarchies are typically observed.

I now explain two key institutional factors, authority-sharing and organizational careers, to show how a firm's context shapes its organizational capabilities. These capabilities, in turn, influence whether a firm chooses to develop innovation internally or acquire it externally.

Authority Sharing

Authority-sharing and delegation from owners to workers play a critical role in shaping organizational capabilities. According to Whitley (2003), the extent to which responsibility is delegated is influenced by social institutions, which promote different forms of authority distribution. In institutional contexts with greater hierarchical distances, authority-sharing is typically limited; in contrast, contexts with lower hierarchical distance tend to support more open and distributed forms of authority. These institutional differences lead firms to develop distinct capabilities for coordination, learning, and reconfiguration. In this thesis, the variation in authority-sharing—particularly between buyer and supplier firms—affects how knowledge and skills are coordinated. Greater authority-sharing promotes joint commitments to growth and continuous process improvement, fostering what Whitley (2003) terms "lock-in." This lock-in, in turn, supports joint investments in knowledge and research, strengthening firm-specific capabilities over those tied to individuals or specific groups.

Organizational Careers

According to Whitley (2003), organizational careers are shaped by the social and legal institutions of a firm's local context. Factors such as employment duration, promotion pathways, and whether roles are cross-functional influence how firms develop their organizational capabilities. These career structures are closely linked to authority-sharing: when employees are committed to an organization long-term, firms are more likely to invest in collaborative problem-solving and the development of firm-specific knowledge. This relationship is especially important in the textile industry's buyer-supplier dynamics, where firms often operate in different institutional systems. In such settings, limited career structures and weak commitments to managerial development can

discourage employees from engaging in activities that build firm-specific skills. This weakens organizational learning capabilities (Whitley, 2003).

When institutional constraints limit a firm's ability to learn, the transition to a (CE), which depends on both learning and reconfiguration, can be hindered. For a CE transition to succeed, the institutional configurations of both buyer and supplier firms, as well as their broader ecosystems, must be compatible. If institutional misalignment impedes knowledge and data sharing between the two, tensions arise, particularly when buyer firms attempt to support suppliers in adopting CE practices (Tan, 2016; Wang et al., 2022).

In contrast, career systems that offer long-term, functionally specialized roles to a broad base of skilled employees tend to foster deeper organizational commitment and collaboration. These structures encourage non-managerial employees to participate in continuous process improvement and innovation. As a result, firms are better equipped to coordinate complementary organizational capabilities through collective effort (Lazonick, 1991; Soskice, 1999; Streeck, 1991; Whitley, 2003). Ultimately, this reinforces the broader argument that institutional structures shape how firms are organized—and that these differences can either support or obstruct collaboration across ecosystems. The table below summarizes these ideas:

Table 1: Organizational Capabilities and their corresponding typical CE response

Type	Authority sharing	Organizational Career	Typical CE response
Isolated autocracy	Minimal	Short, siloed	Opportunistic single-use pilots; heavy reliance on external tech vendors
Managerial hierarchy	Moderate, top-down	Long, functional	Incremental process upgrades; selective tech licensing
Co-operative hierarchy	Extensive, cross-level	Long, cross-functional	Deep in-house R&D and ecosystem co-creation of circular platforms

Source: Developed by author based on Whitley (2003)

The table uses the firm typology Whitley (2003) described in order to illustrate how the nature of the organizational institutional structures of the firm influences the type of CE response, as well as the strategy the firm typically takes for CE transition.

Isolated Autocracy

In firms categorized as isolated autocracies, authority is highly centralized, and organizational careers tend to be short. This limited authority-sharing means decision-making is concentrated at the top, and employees have little autonomy or long-term engagement with the firm. As a result, skilled employees are more likely to leave, taking valuable tacit knowledge with them (Whitley, 2003).

This dynamic undermines learning capabilities, which are essential for sustained innovation. Firms with weak learning infrastructures often struggle to develop technology internally and are thus less likely to pursue internal innovation strategies. While such firms may still possess coordination capabilities sufficient for managing routine operations or external partnerships, their limited reconfiguration capacity restricts their adaptability.

Firms in the Global South often resemble this model, where institutional structuring constrains long-term employment and slows capability development (Rana & Allen, 2021; Rana et al., 2025). Even when managers retain some reconfiguration capacity, the firm as a whole may find itself poorly positioned to implement complex, in-house CE innovations.

Managerial Hierarchy

Managerial hierarchies are characterized by more structured organizational careers and a moderate degree of authority-sharing. Employees advance through clearly defined career ladders, which encourage retention and support the accumulation of firm-specific skills. Over time, this enables firms to develop stronger learning and reconfiguration capabilities.

These firms are better positioned to engage in either internal innovation or well-coordinated external partnerships, depending on strategic fit. Their structured systems make it easier to codify and institutionalize new knowledge, allowing them to incorporate innovations into existing routines (Whitley, 2003). This capability configuration supports a dual approach: they can innovate internally where feasible or partner with external innovators when more efficient.

Cooperative Hierarchy

In cooperative hierarchies, which are more common in the Global North, firms feature flat organizational structures, long-term career paths, and strong authority-sharing practices. Information flows more freely, and employees at all levels are empowered to contribute to

decision-making and problem-solving. These conditions foster high levels of organizational learning, continuous process improvement, and collaborative innovation. Employees become embedded in the firm's innovation routines, enhancing both individual expertise and collective capabilities (Whitley, 2003). As a result, these firms tend to favor internal innovation strategies, since their institutional structure supports sustained, in-house knowledge development.

Furthermore, broad-based career systems extending to non-managerial staff help mobilize diverse expertise and encourage long-term commitment to firm goals. This promotes deep coordination and integration of innovation efforts across the organization (Lazonick, 1991; Soskice, 1999; Streeck, 1991).

In particular, the learning capability of the firm tends to influence its strategy towards CE transition. Organizational learning refers to a firm's ability to generate, absorb, and apply new knowledge about its products, processes, or markets (Whitley, 2003, 2010). This learning process is institutionalized through codification, diffusion, and cumulative improvement (Nonaka & Takeuchi, 1994). When authority-sharing is high and organizational careers are long-term, firms are more likely to retain and build upon employee knowledge. This, in turn, strengthens their learning capabilities—an essential component of any innovation strategy.

Firms with strong learning capabilities are better able to manage uncertainty, adapt to change, and pursue continuous innovation (Lazonick, 1990, 1991; Best, 1990). In contrast, firms with weak authority-sharing or short-term employment structures are less likely to generate firm-specific knowledge or codify it for future use.

While existing organizational capability literature explains how institutional contexts shape firm capabilities, it has not adequately addressed the tensions that arise in cross-ecosystem collaborations, especially in the circular textile industry. In buyer-supplier relationships where firms are embedded in distinct institutional ecosystems, mismatches in authority-sharing and career structures can inhibit knowledge-sharing and joint innovation.

This misalignment is particularly problematic in CE transitions, which require strong learning and reconfiguration capabilities on both sides. When buyer firms attempt to support suppliers in adopting CE innovations, institutional incompatibilities can create friction (Tan, 2016; Wang et al., 2022).

Moreover, International Business (IB) literature still lacks sufficient attention to how institutional differences lead to different innovation strategies—internal development versus external acquisition (Rana & Morgan, 2019). Understanding this link is essential for explaining how firms choose innovation pathways in CE contexts. Thus, the next section discusses CTI in textile ecosystems to explore how specific technologies align with different organizational capabilities and strategic choices.

2.2 Circular Technology Innovation in Textile Ecosystems

CTI refers to process or technological changes that enable the transition from a linear to a CE model. Here, innovation refers to a type of newness or improvement in the implementation of a product. This product may be a tangible good, or an intangible service, wherein the newness or improvement may be implemented within the marketing method or a new organizational method in the practice of that business or industry context (Gault, 2013).

These innovations fall into two main categories: product innovations and process innovations. Product innovations involve changes to the product itself—such as making textiles more recyclable, using biodegradable fibers, or improving carbon efficiency at scale (Whitfield & Maile, 2024). Process innovations involve step-changes in how products are made, including recycling water in production, using enzymes to break down fibers without generating CO_2, implementing mechanical recycling, tracking recycled fibers via software, sorting feedstock with NIRS technology, and reducing energy use through more efficient systems (Hasanbeigi & Price, 2012; Orgerie et al., 2014; Cura et al., 2021; Kanwal et al., 2023; Rana & Whitfield, 2024).

Process innovations often support or lead to product innovations. For example, reducing energy use in manufacturing can improve scalability and sustainability of the final product. Similarly, fiber tracing technologies enhance transparency and traceability, allowing inefficiencies in production to be identified and corrected, thereby opening further avenues for innovation (Rana & Whitfield, 2024).

Innovation and Ecosystems: A Systems Perspective

To understand how these innovations emerge, it is necessary to consider the structure in which they are developed: the innovation ecosystem. An innovation ecosystem is a multilateral structure involving firms and institutional actors who must interact to co-create or capture value through

innovation (Adner, 2017). This concept builds on Adner and Kapoor's (2009) earlier definition of an ecosystem as a network of interdependent actors that collectively contribute to the development of a focal product or service by complementing each other's capabilities.

The term ecosystem was first introduced in a business context by Moore (1996), who described it as an "economic community" sustained by interactions among various actors—not just competitors, but collaborators, suppliers, regulators, and institutions. From this foundation, the field of ecosystem research evolved to study meso-level industrial dynamics, particularly in industries requiring high levels of technological innovation. This meso-level, often referred to as the "systems approach," provides a lens to analyze how value is co-produced across multiple actors and how firms confront interdependent risks and challenges (Porter, 1980; Teece, 1986; Brandenburger & Stuart, 1996; Brandenburger & Nalebuff, 1997; Adner, 2017).

Industries such as IT, medical engineering, and renewable energy exemplify innovation-intensive ecosystems where actors must align their activities due to high interdependence, shared R&D investments, and joint learning opportunities (Carst & Hu, 2023; Kohtamäki et al., 2019; Hein et al., 2020).

Organizational Capabilities as a Precondition for Innovation Ecosystems

Learning, which is the firm's ability to develop, absorb, and apply new knowledge, is essential to both process and product innovation. However, learning is not an isolated activity; it requires cooperation and internal knowledge dissemination. For learning to be effective, a firm's organizational capabilities must be calibrated to support knowledge development and integration across departments and actors.

In this context, not all firms are equally equipped to participate in or benefit from innovation ecosystems. Where organizational capabilities are not structured to support collaborative learning—due to institutional constraints or legacy structures, firms may struggle to engage in ecosystems, even when geographically close (Adner & Kapoor, 2016; Adner, 2017). The firm's ability to engage in CTI, then, is not merely a function of technical capacity or funding, but also of how its routines, authority structures, and learning systems are institutionally embedded and configured.

Variable circular technology

As per extant literature, CTI in the context of textile ecosystems can take on multiple forms, namely being fiber innovation, textile production technologies, design & product development, smart tracking & traceability, waste sorting & processing, recycling & recovery and end-of-life systems. The following table lists these types of innovations, a short description of the type of technology it is and examples for each:

Table 2: List of various CTIs

Type of Innovation	Description	Examples
Fiber Innovation	Development of sustainable, man-made fibers to replace natural fibers.	- Bio-based Fibers: Spinnova's wood-based fibers; MycoWorks' mycelium leather. - Regenerative Cellulosic Fibers: Renewcell's Circulose; Infinited Fiber's Infinna; Birla's Liva Reviva; Evrnu's NuCycl.
Textile Production Technologies	Innovations in manufacturing processes to reduce environmental impact.	- Waterless Dyeing: DyeCoo's CO_2 dyeing technology. - 3D Weaving: Unspun's Vega technology.
Design & Product Development	Designing products for longevity, reuse, and recyclability.	- Modular Designs: Cradle-to-Cradle certified products. - Zero-Waste Pattern Design: Techniques that eliminate fabric waste during cutting.
Smart Tracking & Traceability	Technologies to monitor and trace textile products throughout their lifecycle.	- Digital Product Passports: TextileGenesis platform. - Blockchain Solutions: Farmonaut's traceability system.

Waste Sorting & Processing	Systems to efficiently sort and process textile waste for recycling.	- Automated Sorting: Fibersort technology. - Hydrothermal Separation: HKRITA's Green Machine.
Recycling & Recovery	Methods to reclaim materials from used textiles or scrap fabric (e.g., pre-consumer waste).	- Mechanical Recycling: Recover's recycled cotton fibers - Chemical Recycling: Ambercycle's molecular regeneration process.
End-of-Life Systems	Solutions for the final stage of a product's lifecycle to ensure sustainability.	- Compostable Textiles: Development of biodegradable fabrics. - Enzymatic Degradation: Research into bio-based decomposition methods.

Source: Developed by author based on Whitfield & Maile (2024), UNEP (2023), Kim (2025), Spinnova (n.d.),, MycoWorks, (n.d.), Renewcell, (n.d.), Infinited Fiber, (n.d.), Liva Reviva, (n.d.), Evrnu, (n.d.), DyeCoo, (n.d.), Unspun, (n.d.), Cradle to Cradle Products Innovation Institute, (n.d.), TextileGenesis, (n.d.), Farmonaut, (n.d.), Fibersort, (n.d.), HKRITA, (n.d.), Recover, (n.d.) and Ambercycle, (n.d.)

Fiber Innovation and Product Design

Fiber innovation and textile design are deeply interconnected, as both involve technological transformations at the material level. These include developments such as chemical recycling (e.g., Ambercycle) and the creation of bio-based fibers (e.g., Spinnova, Circulose). These innovations introduce new technical knowledge that must be internalized and routinized within the firm to generate efficiency.

To successfully adopt such innovations, a firm needs robust learning capabilities, including systems for codifying know-how, retaining experienced employees, and investing in R&D. In firms with long-term organizational careers and strong internal structuring, such as cooperative hierarchies, knowledge is often co-created and formally embedded into routines (Whitley, 2000, 2003, 2010). Conversely, firms with high turnover and weak career structures may lack the internal stability for sustained learning, often resorting to acquiring the innovation externally.

For example, chemical recycling requires more than just technology, it also demands staff training, revised procedures, and new quality standards. These are far easier to implement in firms where learning and authority-sharing structures are embedded into daily operations.

Textile Production Technologies and Reconfiguring Capability

Circular production technologies such as zero-waste design and waterless dyeing (e.g., DyeCoo) challenge existing production systems and require deep structural changes. Adopting these technologies may involve installing new machinery, redesigning factory layouts, reworking supplier contracts, and redefining the value proposition of the final product.

Such changes depend heavily on a firm's reconfiguring capability, its ability to reshape internal routines, processes, and workflows. Firms with participatory work cultures and empowered employees, such as those in cooperative hierarchies, are typically more adaptable. These firms are better suited to reorganize operations from the ground up in response to new sustainability imperatives.

By contrast, managerial hierarchies, with more rigid control and decision-making structures, may reconfigure more slowly, as changes cascade down from managers to staff. Isolated autocracies may avoid reconfiguration altogether by acquiring firms already equipped with such technologies, effectively outsourcing innovation rather than developing it internally.

Smart Tracking, Traceability, and Waste Sorting

Technologies such as digital product passports (e.g., TextileGenesis) and automated waste sorting systems (e.g., Fibersort, Green Machine) require firms to coordinate across complex supply chains and multi-actor networks. These tools enable traceability and transparency, which are critical for closed-loop systems in circular production.

Firms with high authority-sharing and decentralized structures—again, cooperative hierarchies, tend to coordinate more effectively with external partners. Empowered employees across levels can engage proactively with suppliers, recyclers, and logistics partners, enabling smoother alignment and mutual problem-solving.

In contrast, isolated autocracies, with centralized decision-making and limited external engagement, often lack the trust-based relationships necessary to implement such coordination-

intensive technologies. In such cases, firms may choose to acquire a partner already using platforms like TextileGenesis and link their operations externally rather than develop the capability in-house.

Recovery, Recycling, and End-of-Life Systems

End-of-life recycling technologies are among the most complex in the circular textile landscape. For example, enzymatic hydrolysis—as developed by HKRITA—can break down 100% cotton or polyester textiles, but most fabrics are blends, making them difficult to process with current methods. Unlike polypropylene nonwovens, which can be cleanly melted and remade, blended natural fibers present greater recovery challenges.

Developing solutions to this problem requires embedded learning capabilities, supported by long-term organizational careers and authority-sharing cultures. Prototyping, testing, and refinement demand ongoing internal collaboration, which is difficult to achieve in firms with high employee turnover or rigid hierarchies.

Once a viable recovery method is developed, scaling requires strong coordination capabilities to manage supply chain integration and logistics. Finally, the successful integration of this new method into daily routines depends on reconfiguring capabilities—ensuring that employees, workflows, and quality standards adapt to the new system.

While previous sections have established how firms' internal capabilities shape their ability to adopt or develop circular technologies, it is important to position these capabilities within broader institutional contexts. In coordinated market economies, where institutions foster authority-sharing, long-term careers, and formal knowledge structuring, firms are more likely to develop the organizational capabilities needed for circular innovation (Whitley, 2010). These conditions support internal development and scaling of technologies such as enzymatic hydrolysis or waterless dyeing. In contrast, liberal or weakly coordinated systems often produce firms with rigid hierarchies, high turnover, and fragmented learning structures—conditions that favor external acquisition over internal innovation.

For example, a firm operating under such rigid structures may choose to acquire a company already using enzymatic hydrolysis rather than developing the capability internally. This strategy reflects an institutional response, hedging against regulatory uncertainty or lack of support for

sustainability by internalizing innovation through acquisition instead of partnership or ecosystem development.

This highlights a broader point: institutional configurations not only shape how firms build capabilities but also influence the strategic pathways they pursue to engage in circular innovation. Yet, while the literature on circular technology often explores challenges of value capture across firm boundaries, it rarely places emphasis on the institutional foundations that enable different forms of firm capabilities to emerge in the first place.

To further understand this gap, the next section reviews how institutional structures influence the development of innovation strategies—specifically within the context of CTIs.

2.3 Institutional Structures Influencing Innovation Strategies

Institutional Structures

Institutions are the rules of the game (North, 1991). They represent human-made, often invisible systems of constraint and enablement that shape political, economic, and social interactions (North, 1991; Rana, 2022). As Scott (1995) defines, institutions are composed of regulatory, normative, and **c**ultural-cognitive elements that create order, stabilize routines, and shape access to resources in specific societal or market contexts. These elements lend institutions a high degree of resilience and long-term influence (Scott, 1995; Rana et al., 2023).

Where formal institutions are coherent and robust—such as in many Global North contexts—they tend to support innovation strategies through strong research infrastructure, stable labor markets, intellectual property protections, and skill development systems (Whitley, 2000, 2003). In contrast, firms in Global South supplier countries like Bangladesh operate in fragmented or underdeveloped institutional environments, often lacking these formal supports. This limits capability development and pushes firms to rely more on informal institutions to structure organizational routines (Mair & Marti, 2009; Rana & Sørensen, 2021).

This divergence creates a governance tension between Global North buyer firms—typically embedded in highly structured ecosystems—and Global South suppliers, whose organizational capabilities reflect weaker institutional contexts. As Whitley (2000, 2003) highlights, institutional context shapes both the capabilities firms develop and the performance of their ecosystems.

The result is not just differing firm behaviors but diverging innovation strategies. This becomes particularly significant in the context of a CE transition, which depends on coordination between actors embedded in different institutional systems. For the CE transition to succeed, both the supplier's and buyer's ecosystems, each shaped by their own institutions, must cooperate across national boundaries (Rana & Allen, 2021).

Global North buyers increasingly seek to govern value chains more tightly, while suppliers aim to maintain access to revenue streams, creating an interdependence between two distinct ecosystems. The interaction between these ecosystems, often with significant institutional distance, forms the basis for how circular innovation strategies are negotiated and enacted (Gereffi et al., 2005).

Innovation strategies

To understand how these institutional differences shape firm behavior, we turn to Whitley's (2000) innovation strategy typology. This framework illustrates how organizational institutional complementarity, i.e., the fit between institutional structures and organizational routines—determines whether a firm can pursue specific innovation strategies, both within and beyond its local ecosystem.

Table 3: Typology of Innovation Strategies based on codification and complexity of knowledge

Type of Strategy	Requirement for Codification	Complexity of Knowledge	Example of Circular Innovation Strategy
Dependent	Low	Low	Sorting pre-consumer waste for third-party recycling according to buyer requests/pressure
Craft-based Responsive	Moderate	Moderate	Using bio-degradable fabrics or organic dyes for compliance with sustainability standards
Generic	Moderate	High	Installing and reconfiguring production habits around low water dyeing machines
Complex, Risky	High	High	Developing enzymatic recyclable fibers internally

Transformative	Highest	Highest	Developing an internal system of production, collection and recycling fabrics with embedded digital passports and software-based tracking for fibers

Source: Developed by author based on Whitley (2000)

This table adapts Whitley's (2000) innovation strategy framework to CTI in the textile industry. It is structured along two analytical dimensions: the need for knowledge codification and the complexity of knowledge involved in innovation. These dimensions reflect the institutional and organizational capacities required for firms to adopt specific innovation strategies. Each of the five strategy types is illustrated with a relevant example from the circular textile domain.

Dependent Strategy

Dependent strategies involve low knowledge complexity and minimal codification. Firms following this approach typically respond to buyer mandates with little internal change. Their innovations are externally driven and compliance oriented. An example is sorting pre-consumer waste for third-party recyclers, a practice often adopted to meet external expectations rather than to build internal capabilities.

Craft-Based Responsive Strategy

This strategy requires moderate codification and leverages skilled labor and market feedback. Innovation takes the form of incremental improvements, often grounded in artisanal knowledge or adaptive practices. A typical example includes switching to biodegradable fibers, downgauged fabrics, or organic dyes in response to sustainability demands. These changes are integrated gradually through continuous refinement of existing practices.

Generic Strategy

Generic strategies combine moderate complexity and codification. They aim at operational efficiency or regulatory compliance through the use of standard technological solutions. For example, reconfiguring production around low water dyeing machines allows firms to reduce environmental impact while upgrading their systems through predictable, well-understood innovations.

Complex, Risky Strategy

These strategies involve high knowledge complexity and require formal codification systems. Innovations are often disruptive and rely heavily on internal expertise, cross-functional collaboration, and institutional support. A key example is the internal development of enzymatic recycling processes capable of breaking down blended fibers—technologies that remain at the frontier of circular textile innovation and demand significant capability investment.

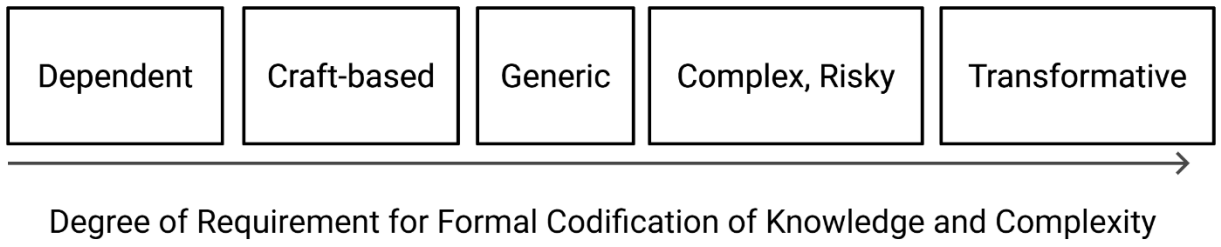
Transformative Strategy

Transformative strategies represent the highest levels of complexity and codification. They aim to destroy existing routines and systems by embedding innovation across the entire value chain (Whitley, 2000). An example is the creation of a fully integrated internal recycling ecosystem—from production and sorting to digital tracking via product passports. This approach redefines how materials are processed, traced, and recovered, requiring deep institutional alignment and organizational adaptability.

This typology not only reflects escalating levels of innovation ambition but also illustrates how a firm's institutional context and capability structure shape its strategic options. Firms embedded in supportive institutional environments that enable formal knowledge codification and complex learning—are more likely to pursue advanced strategies. Those without such structures often remain confined to simpler, compliance-based approaches.

To further clarify the ideas in Table 3, the following figure presents a simplified visual model of this typology and the underlying conceptual distinctions.

Figure 2: Institutionally Derived Innovation Strategies



Source: Developed by author based on Whitley (2000)

This figure and typology visualize how a firm's circular innovation strategy reflects its ability to codify and manage knowledge of varying complexity. On the left end of the spectrum, both knowledge complexity and codification requirements are low; on the right, both are high. As the complexity of knowledge and the demand for formal structuring increases, the innovation strategy becomes more ambitious, requiring deeper organizational capability.

When applied to suppliers embedded in different institutional contexts, this framework highlights how institutional differences shape the firm's capacity to engage in various types of innovation. Suppliers located in regions with distinct methods of organizing and codifying knowledge, particularly when compared to Global North buyers—must often adapt their capabilities to align external CE transition demands. However, simply having structured knowledge systems (e.g., manuals, patents, algorithms) and long-term employees does not guarantee that a firm will adopt a transformative strategy. The capability may exist without the necessary incentives, risk tolerance, or institutional support to activate it (Dao et al., 2021).

In institutionally coherent ecosystems—where state policies, regulatory incentives, or coordinated governance structures promote CE collaboration—firms are more likely to engage in aggressive or multilateral innovation strategies (Su et al., 2018; Liu et al., 2020; Hu et al., 2024). These ecosystems enable stronger inter-firm cooperation, deeper knowledge codification, and broader technology adoption. Conversely, in less supportive institutional environments, firms may face regulatory or financial disincentives that suppress innovation potential. For instance, a supplier may avoid recycling pre-consumer fabric waste if taxed both on the sale of waste and on the purchase of recycled fiber, rendering even a basic dependent strategy financially unviable.

Among the five innovation strategies discussed, this thesis focuses specifically on the dependent and craft-based responsive strategies. These two strategies were intentionally selected to reflect firms situated in contrasting institutional contexts, one from a weaker institutional environment and one from a stronger, more coherent one. This comparative focus allows for a deeper exploration of how institutional structures shape organizational capabilities, and how these capabilities in turn influence the adoption and execution of different innovation strategies.

By grounding the analysis in two concrete case studies, I aim to show how variations in authority-sharing, career systems, and institutional alignment result in different innovation pathways and risk behaviors in the context of circular innovation. Understanding this contrast helps explain why

certain firms succeed in circular innovation—despite institutional constraints—and how their internal structures support or hinder that success.

Despite buyer pressure and support, suppliers have struggled to adopt circular technologies due to fundamental differences in organizational capabilities—differences shaped by their respective institutional contexts. Existing literature has yet to offer an integrated perspective that combines the ecosystem view with the institutional structuring of innovation strategies, organizational capabilities, and firm context.

In the following section, I synthesize key insights from the literature review. I first outline how the CE is conceptualized in existing research, then develop a theoretical framework that connects these concepts into a cohesive analytical model.

2.4 Conceptual Framework: Influence of Organizational Capabilities on Innovation Strategies for Circular Technology Innovation

Circular Economy and Institutional Preconditions

The CE aims to reduce greenhouse gas emissions, waste, and water consumption by slowing, closing, and narrowing resource loops (Bocken et al., 2016). Through recycling, reuse, and more efficient production systems, CE offers a pathway toward sustainable industrial transformation (Geissdoerfer et al., 2017). In essence, it seeks to link the two ends of the linear production cycle, transforming "cradle-to-grave" into a regenerative, cradle-to-cradle model (McDonough & Braungart, 2010).

While CE adoption has gained momentum in high-waste, resource-intensive industries like textiles (Jia et al., 2020; Akter et al., 2022), firm-level efforts—especially from suppliers—remain constrained. Research increasingly shows that CE cannot succeed through isolated initiatives; it depends on system-wide coordination among actors and institutions across the value chain (Ranta et al., 2018; Rana & Allen, 2021).

Institutional Support and Strategic Capability Gaps

The success of CE adoption hinges on a firm's ability to develop and integrate green innovations. But this ability is shaped by the institutional context: policy support (Nilsson et al., 2012), R&D infrastructure (Porter & Stern, 2001), collaboration incentives (Tan, 2016), and ecosystem complementarity (Jacobides et al., 2018) all matter. Equally important is the cognitive-cultural environment, which affects public and commercial acceptance of circular products (Calvo-Porral & Levi-Mangin, 2020).

In contexts where authority-sharing is encouraged and career structures are long-term—such as Denmark—firms tend to adopt transformative innovation strategies supported by deep internal capabilities (Whitley, 2000; Rana & Sorensen, 2021). In contrast, firms in environments with weak institutional support, such as Bangladesh, often face short organizational careers and centralized hierarchies, limiting their ability to innovate internally (Rana & Sorensen, 2021).

Case in Point: The H&M–Circ Breakdown

This institutional misalignment is exemplified by H&M's failed collaboration with Circ. Aimed at recycling pre-consumer waste in Bangladesh using chemical methods, the initiative was undermined by structural obstacles: absence of policy incentives, a powerful informal waste economy, and institutional hostility toward greenfield foreign investment (Rana & Whitfield, 2024). Circ eventually relocated to Indonesia, leaving H&M's Bangladeshi suppliers reliant on low-yield mechanical recycling and jeopardizing its 2030 carbon goals (H&M Group, 2024).

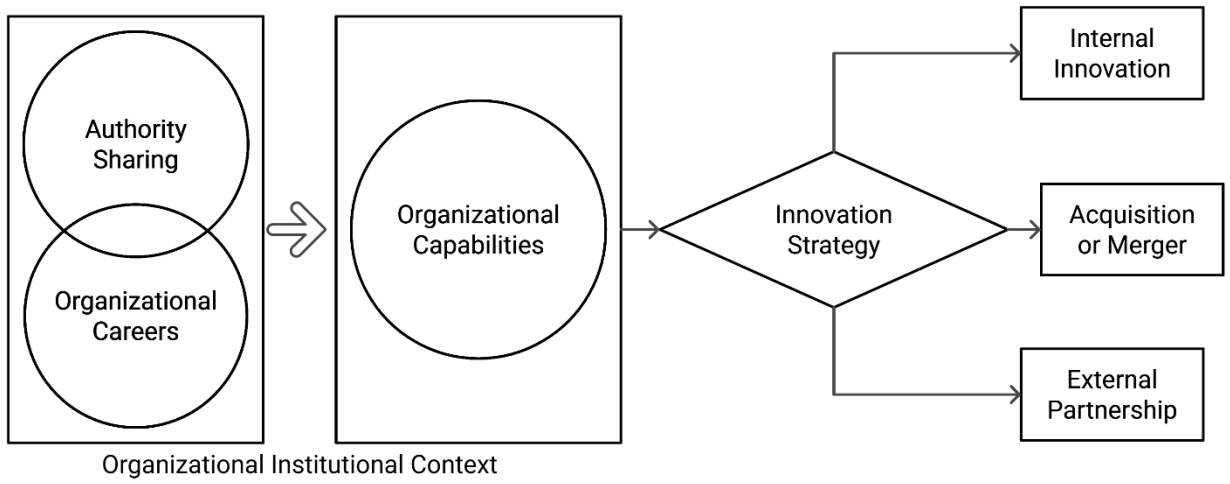
The case demonstrates that innovation ecosystems cannot be built in isolation—they require complementarity between buyer and supplier ecosystems, not just in terms of logistics or capital, but in organizational capability and institutional alignment.

Synthesis: Institutions Shape Innovation Pathways

Across the CE, ecosystem, and organizational capability literature, one insight is clear: firms in institutionally coherent environments are more likely to pursue internal CTIs. Institutional features such as authority-sharing and longer careers foster not only stronger learning routines but also support for higher-order innovation strategies. Conversely, in fragmented institutional environments, firms often resort to generic or dependent strategies, driven by external mandates or limited internal capacity.

This synthesis now sets the stage for the conceptual model that follows, which maps how institutional configurations shape organizational capabilities and, in turn, influence the firm's strategic orientation toward CTI. The following figure was developed according to my understanding of the above theoretical framework.

Figure 3: The institutional structuring of innovation strategies and organizational capabilities for green technology innovation decisions



Source: Developed by author based on Whitley (2000, 2003, 2010)

This figure serves as the conceptual framework for the analysis section of my thesis. It guides the coding of empirical data, helping identify patterns consistent with the theories used, as well as deviations that may require theoretical extension. The framework begins with the organizational institutional context, specifically focusing on two key informal institutional features: authority sharing and organizational careers. These elements shape the firm's organizational capabilities, such as its ability to coordinate, learn, and reconfigure in response to change.

These capabilities, in turn, inform the firm's circular innovation strategy, that is, how it chooses to adopt or develop innovation. This can take one of three primary forms:

- Internal Innovation, where technologies are developed in-house through R&D;
- Acquisition or Merger, where innovation is brought in by internalizing another firm;
- External Partnership, where the firm collaborates with external actors to access innovation.

These strategic approaches are not discrete categories but represent a spectrum. Internal innovation and external partnership occupy opposite ends, while acquisition or merger sits at an intermediate point, reflecting partial internalization without full integration or capability development.

Ultimately, the pathway a firm follows is shaped by the interaction between its institutional context and its organizational capabilities, which together constrain or enable its strategic options in a CE transition.

3. Methodology

This section presents the methodology used to investigate how organizational capabilities influence firms' internal or external innovation decisions, and how institutional structures shape CTI in textile ecosystems. It begins with the study's philosophical foundation, followed by the methodological stance, research design, and methods of data collection and analysis. Each component is critically aligned with the research questions to ensure coherence between theoretical assumptions, methodological approach, and empirical execution.

3.1 Philosophy of Science

3.1.1 Ontology

My thesis is grounded in social constructivist as its ontology, and in interpretivism as its epistemology (Berger and Luckmann, 1966). Within this paradigm, organizational capabilities, institutional structures, and firm behaviors are understood as phenomena continuously constructed and reconstructed by actors embedded in specific social, economic, and institutional contexts. For case studies, and especially my thesis, a social constructivist perspective will aid not only in creating a lucid understanding of the social phenomena being investigated, but also in generating a rudimentary generalization, the results of which can be tested through replication (Priya, 2021; Antwi & Hamza, 2015). Ontology refers to the branch of philosophy that is concerned with the articulation of the nature and structure of the world (Wand & Weber, 1993, p. 220), where social constructivists assume that reality is a socially constructed phenomenon (Neuman, 2003; Scotland, 2012).

Constructivist is categorized as a form of 'subjectivism', where reality exists within the awareness of the actors constructing it and does not exist without it, which is in contrast to the notion of 'positivism', which posits that reality is an external construct that objectively exists, even without the actors' knowledge of it (Crotty, 1998, p.43). Consequently, different actors construct truth in different ways, and what is acknowledged as truth can be characterized as consensus between several 'co-constructors', as opposed to being positivistic truth (Scotland, 2012, p. 11-13).

3.1.2 Epistemology

My research embraces an interpretivist epistemology, which asserts that knowledge is shaped through subjective experiences and interpretations of social actors (Willis, 1995; Gephart, 2018; Myers, 2009). This perspective was chosen because it aligns with the objective of understanding organizational capabilities, firm behaviors and institutional influences from the interpretation of the subjective experience of actors within the firm, aligning with the 'how' and 'what' questions this thesis aims to answer. Epistemology refers to the nature of the relationship between the researcher and the phenomenon under study, of how knowledge is acquired and validated, where "the nature of human knowledge and understanding that can possibly be acquired through different types of inquiry and alternative methods of investigation" (Hirschheim et al., 1995, p. 20).

Interpretivism maintains that reality consists of the actors' subjective experiences of the external world, i.e., that reality is constructed by humans, and as such, there is no single correct route or method to knowledge (Willis, 1995; Mutch, 2005; Antwi & Hamza, 2015). Subsequently, the interpretive paradigm is underpinned by the acts of observation and interpretation, wherein to observe is to collect information as data, whereas to interpret is to make meaning or create an understanding of that data by drawing inferences, matching patterns or abstraction (Aikenhead, 1997). Interpretivism inherently assumes that knowledge and meaning are acts of interpretation themselves, and as such, there is no objective knowledge that is independent of thinking, reasoning humans within any given context (Gephart, 2018; Myers, 2009; Antwi & Hamza, 2015; Reevers & Hedberg, 2003).

3.1.3 Paradigm Justification

My thesis aligns with the subjectivist paradigm as defined by Burrell and Morgan (1979), wherein social reality is viewed as constructed, dynamic, and context specific. Drawing on Kuhn's (1962)

concept of paradigms, this study explicitly adheres to a single, coherent paradigm rather than mixing multiple philosophical positions, ensuring internal consistency between ontology, epistemology, and methodology (Guba & Lincoln, 1994). In doing so, my thesis grounds itself to a specific position, enabling the study to have methodical coherence and rigor from its outset, as opposed to simply performing research according to undefined heuristics. This allows me to create knowledge that is categorizable, falsifiable and built upon a stream of arguments that are drawn for the purpose of theoretical modeling (Popper, 1963).

3.1.4 Conceptual foundations and alignment with research

In addition to clarifying the ontological and epistemological stance of this research, it is critical to demonstrate how the key theoretical constructs, which are informal institutions, organizational capabilities, CE, and innovation ecosystems, are aligned with the constructivist paradigm. This ensures that not only the research process but also the conceptual framing remains philosophically coherent.

Institutions as Social Constructs

Institutions, typically defined as formal rules, informal norms, and shared belief systems (see North, 1990; Scott, 2005; Rana & Allen, 2024), are not static or objectively "real" in the positivist sense. Rather, they are dynamic phenomena constructed and maintained through collective recognition and enactment (Berger & Luckmann, 1966; Whitley, 2003). The same regulatory framework may manifest differently across contexts depending on how actors interpret and engage with it, reflecting institutions' embeddedness in local histories, cultures, and actor networks.

In my thesis, institutions are understood as both contextual enablers and constraints that shape innovation strategies. Their form and function arise through the ongoing practices and consensus of actors, making them inherently constructivist phenomena.

Organizational Capabilities as Constructed Competencies

Organizational capabilities, defined as firms' abilities to coordinate, learn, and reconfigure assets and routines (Teece et al., 1997; Whitley, 2003), are deeply rooted in social interaction. These capabilities do not pre-exist as objective entities; rather, they are produced, sustained, and transformed through the embedded actors' agency, organizational culture, and learning processes.

For instance, a firm's ability to implement a new recycling technology depends not only on technical know-how but also on tacit knowledge, shared routines, and culturally ingrained practices that evolve over time (Whitley, 2003). These competencies are constructed within the firm's social fabric and are continually reshaped through interaction and adaptation, aligning with a constructivist view of organizational life. This means that organizational capabilities are intangible ideas as opposed to being objective reality that exists. The capabilities are a part of the social fabric constructed by multiple co-constructors, and their absence would mean that the capabilities themselves would cease to exist in any meaningful way.

Circular Economy as a Constructed Framework

Although often conceptualized in technical terms such as material loops or waste reduction, the CE is increasingly recognized as a socially constructed framework (Korhonen et al., 2018). Its definition, prioritization, and implementation differ across regions and firms, shaped by local interpretations, values, and institutional pressures.

In practice, circularity is not a fixed standard, but an evolving set of meanings and practices negotiated by actors within specific ecosystems. For example, what constitutes "circular" innovation in Denmark may differ from Bangladesh due to differing cultural, regulatory, and market interpretations. It is also a relatively recent development that CE is beginning to include workers' wellbeing as a dimension, which roots it in constructivist, as the framework cannot be put into action unless the actors involved in both its creation and its enforcement are present.

Thus, CE in this thesis is treated as a dynamic, socially embedded phenomenon, consistent with the constructivist paradigm.

Innovation Ecosystems as Emergent Social Systems

Innovation ecosystems, comprising networks of firms, institutions, and intermediaries, are inherently relational and socially constructed. Their boundaries, governance structures, and functional dynamics are not predetermined but emerge through the interplay of actors' strategies, collaborations, and conflicts (Adner & Kapoor, 2010; Whitley, 2000).

For example, the ecosystem in which Fibertex Personal Care A/S operates is not a "thing" that exists independently. Rather, it is an ongoing process of negotiated roles, power dynamics, and

shared visions among firms, regulators, and complementors (Adner, 2017). Its evolution is contingent on interpretive processes and adaptive behaviors, reinforcing its constructivist character as a subjective idea that is constructed by the actors present within the system's context, rather than a positive force that exists objectively.

Synthesis

In light of the above, all major theoretical components of my thesis, namely institutions, organizational capabilities, CE frameworks, and innovation ecosystems, are best understood as socially constructed, context-dependent phenomena. Their existence and meaning arise from the interactions, negotiations, and shared understandings of actors embedded within particular institutional contexts, thus being constructed phenomena.

This reinforces the philosophical coherence of the thesis: not only is the research process grounded in a social constructionist ontology and interpretivist epistemology, but the conceptual framework itself is inherently constructivist. This alignment ensures that the study remains true to its foundational commitment to understanding contextualized and actor-driven phenomena within the circular textile industry.

3.2 Research Design & Case Background

The research questions asked by this thesis are:

A. How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations in the textile industry?
B. How do institutional structures influence circularity innovation strategies within textile ecosystems?

To answer these questions, I adopt an interpretivist paradigm and a qualitative, abductive research strategy. I also employ a comparative case study design (Yin, 2018) to examine two firms operating in distinct institutional contexts: Fibertex Personal Care (Denmark) and DBL Textiles (Bangladesh). This comparative design enables me to highlight the differences between institutions in each respective region (i.e., the global north and global south), as well as see how those institutional contexts influence green technology innovations within their respective ecosystems, offering theoretical generalizability through analytic inference (Eisenhardt, 1989; Bartlett &

Vavrus, 2017). Case studies are most appropriate for answering 'how' and 'why' questions in order to explain potential cause-and-effect relationships between different phenomena (Yin, 2018; Priya, 2021), and so this design was chosen due to its ability to capture and describe a naturally occurring phenomenon in-depth.

Furthermore, a comparative case study design allows me to cross-examine the organizational capabilities of each firm in order to analyze the differences in a comparative manner, allowing me to further the understanding of how firms' organizational capabilities shape their decision for either internal or external innovation.

The comparative case study approach is a heuristic, wherein the term comes from the Greek word meaning 'to discover'. As such, the comparative design of this thesis is intended to be a means of further discovery and inquiry towards extending already-present theories through a comparison of different yet similar cases. The 'tracing' logic is also applied, where cases are compared with one another on multiple basis such as moving from institutional comparisons to innovation strategy comparisons, to also comparing organizational capabilities, tracing a line of logic through these in order to break down the phenomenon to its constituent parts to understand and explain differences, as well as excavate any exceptions the theory does not describe adequately, thus extending the theory itself as well (Barlett & Vavrus, 2017; Bazeley, 2020, p.255).

The unit of analysis is the firm, viewed through the lens of its organizational capabilities, innovation strategies, and institutional embedding. Embedded units such as key decision-makers and managers provide detailed insights.

Both case firms are within the circular textiles industry. Fibertex Personal Care makes fabric for personal hygiene products such as diapers, napkins and to a lesser degree, face masks, and their primary buyers are Procter & Gamble (P&G), the Sweden-based buyer Essity, Belgium buyer Ontex and the Danish Abena (Fibertex, 2024). On the other hand, DBL Textiles is one of the largest apparel manufacturers in Bangladesh, whose top buyers are Walmart-George, Puma, Esprit, and G-Star; buyer firms that are situated within Europe, the United States and Canada, regions typically included within the 'global north'.

Furthermore, both firms are engaged in the circular textile industry, where Fibertex, as a supplier firm, is creating value for buyers by way of reducing the weight of their material without

sacrificing tensile strength or fabric, while DBL is adopting new technologies for recycling textiles and apparels with support from their buyers, who are located in the EU. Thus, Fibertex is innovating internally, while DBL is acquiring technology through external means.

3.2.1 Case Selection and Description

The two focal cases, Fibertex Personal Care and DBL Textiles, were selected through purposive sampling (Patton, 2002; Etikan et al., 2016), ensuring they meet pre-defined criteria relevant to the research questions.

Purposive sampling is a type of non-probability sampling that is typically used in qualitative research to identify and categorically select the most information-rich and appropriate cases for study (Patton, 2002; Etikan et al., 2016). In this instance, both cases are participating actively in the circularity transition, but for varying reasons. Where Fibertex Personal Care A/S is engaging with circularity transition internally, being influenced by its local institutional context as its host country Denmark is a member of the EU, DBL Textiles is influenced by buyers situated in the EU, who are required by regulators to source apparel that is produced in a sustainable way. As the purpose of this thesis is to understand 'how' institutional structures influence green technology innovation within the circular textile industry, and 'how' organizational capabilities shape the firm's ability for either internal or external innovation, it is necessary to actively select and study cases that fulfil these a-priori conditions (Ghauri & Firth, 2009). Both Fibertex Personal Care A/S and DBL Textiles fulfill these conditions, making them important cases for study in order to properly answer the research questions I seek to examine. Furthermore, the cases differ substantially in their institutional environments, despite their strategic focus on sustainability, making them suitable for comparative analysis at the ecosystem level. Key informants within the organizations were selected based on their roles in innovation-related decision-making and degree of managerial responsibilities.

The table below shows the cases and their respective information side-by-side for comparison.

Table 4: Case presentation for Fibertex and DBL

Type of Difference	Fibertex Personal Care A/S (Denmark)	DBL Textiles (Bangladesh)
Organizational Capabilities	Purpose-driven, experimental and proactive	Hierarchical, cautious, reactive

Institutional Conditions for circularity transition	Organized, coherent, supportive	Fragmented, asymmetrical, obstructive
Authority Sharing	High	Limited
Organizational Careers	Long and cross-functional	Long for managers
Innovation Strategy	Internally Developed	Externally Acquired

Source: Developed by the author based on case data

As shown in **Table 4**, Fibertex Personal Care A/S is one of the world's largest manufacturers of a type of fabric known as "spunbond" or "spunmelt", variations of nonwoven fabrics, for the hygiene industry. It is a supplier firm located in Denmark, producing nonwoven components for diapers, sanitary napkins and other incontinence products for American and Swedish buyers. It began operating in 1968 as Fibertex ApS, until it changed ownership in 1996, where it became Fibertex A/S. It was also this year that the Fibertex Personal Care division was established and made its way into the hygiene products market. In 2024, Fibertex Personal Care A/S published its first ESG report by itself, where up until that point, Schouw published ESG reports for its businesses as a whole, with a section dedicated to Fibertex in the whole report. It is characterized by its high degree of authority sharing due to an influence of Danish culture, long and cross-functional organizational careers where employees begin as frontline workers and can climb up and across multiple departments over time. Their main innovation is the reduction of the industry standard 25 GSM (gram per square meter) spunbond nonwoven fabric down to only 5 GSM, which is still undergoing testing, but they have successfully deployed a 7 GSM variant for sale to buyers. Their innovation is internally developed.

In contrast, DBL Textiles is one of the largest manufacturers and exporters of knit garments in Bangladesh. It is a supplier firm that produces knit garments for primarily Swedish, American and Canadian buyers. DBL was established in 1991 as Dulal Brothers Limited, as a single factory for garments production, then expanding into a diversified conglomerate with a focus on garments by 2025. DBL Textiles has been participating in mechanical recycling of fabric waste since 2022 (DBL Group, 2024), where they established DBL Textile Recycling Ltd., a sister concern under the DBL Group. In 2022 alone, DBL Textiles reportedly recycled around 890,000 kilograms of cotton, saving 8 million liters of water on growing cotton (Denim Focus, 2023). It is characterized by its limited degree of authority sharing, often being bound to top managerial positions, which are further occupied by employees with long organizational careers. They imported machines for

mechanical recycling of fabric, while also establishing a sister concern to make use of it, which indicates that their innovation is externally acquired.

3.3 Data Collection and Analysis Method

Given the ontological and epistemological standpoint I take for this research, semi-structured interviews would be selected as the methodology for the purposes of meaning-making. Semi-structured interviews allow for the researcher to ask probing but open-ended questions around a specific topic, then ask follow-up questions in order to build a discussion (Adeoye-Olatunde & Olenik, 2021). This method inherently relies on the subjective relationship between the researcher and the actors, allowing the full complexity of the topical phenomenon to be investigated using human sense-making mechanisms as the situation unfolds (Kaplan & Maxwell, 2005).

The interview transcript is not a simple literal record of the oral exchange between interviewer and interviewee, but a medium of co-constructed meaning-making (Kvale, 1996; Gephart, 2018). After initial transcription using OpenAI's Whisper model, which produced noise and incoherence due to its literal capturing process, the raw transcripts were reorganized into coherent, structured narratives with support from OpenAI's ChatGPT, to preserve the intended meaning of interviewees and reduce distortion introduced by machine transcription.

Since language is a medium through which meaning is co-constructed, sections of the DBL Textiles interviews that were originally spoken in Bangla were interpreted rather than translated to preserve intent (Berger & Luckmann, 1966; Temple & Young, 2004). As a high-context language, Bangla resists direct translation without loss of nuance, requiring instead a 'thick description' approach that retains intention and cultural context (Geertz, 1973). I used this interpretive process in order to avoid meaning-loss by reconstructing what was said into a coherent narrative (Alvesson & Sköldberg, 2017).

Furthermore, given this thesis' interpretivist orientation, transcript editing and translation are not treated as neutral transformations, but as interpretive reconstructions rooted in my dual positionality as both interviewer and cultural insider. This approach enhanced the depth and clarity of the data while also increasing interviewees' comfort and openness during interviews (Cooke, 2002; Rana & Sørensen, 2021).

Semi-structured interviews were conducted across three rounds, in August 2024, December 2024 and May 2025. A total of seven managerial personnel were interviewed, four from Fibertex, who are namely the Operations Director (F1), R&D Director (F2), Sales Director (F3) and CEO (F4), and three from DBL Textiles, namely the Sustainability Head (D1), Innovation Head (D2) and Production Head (D3). Transcripts of the interviews are attached to **Appendix 1**. Supplementary data in the form of published sustainability reports were gathered from Schouw, which is Fibertex's owner and DBL Textile's website, which were used to triangulate and enhance validity of the analysis process (Kaplan & Maxwell, 2005).

3.3.1 Abductive Process

In order to answer the research questions posed by this thesis, I pursue an abductive method, using both literature-driven theoretical codes as well as data-driven codes in order to develop second-order constructs relating to how institutional structures influence green technology innovation within circular ecosystems, and how organizational capabilities drive firms' decisions between internal or external innovation. As per Dubois and Gadde (2002), abduction involves iterative movement between empirical data and theoretical frameworks, enabling refinement of existing theories and discovery of novel insights. This approach is particularly suitable for the study's aim to explain "how" and "why" institutional and organizational factors shape innovation processes, especially within the under-researched context of circular textile ecosystems.

Abduction as an approach is distinct from deduction, which is where specific conclusions are derived from general assumptions, i.e., reasoning is theory-driven, and distinct from induction, which is where theoretical insights are drawn from observations, i.e., reasoning is data-driven. Abductive research involves applying both deduction and induction in iteration, allowing for resulting conclusions to be drawn from both the data and the theory in literature; a case of the best of both worlds (Dubois & Gadde, 2002; Saunders et al., 2009; Lipscomb, 2012). Considering that the purpose of my thesis is to create new understanding and fill a gap in knowledge within extant literature, abduction is the appropriate choice due to its cyclical and flexible nature, as well as examining context-specific and complex phenomena that are typically embedded within research cases (Dubois & Gadde, 2002; Lipscomb, 2012).

In application of the abductive method, I developed codes from the theories discussed in the literature review, then used those codes to drive the empirical examination, while simultaneously

allowing for data-driven codes to emerge. Interview transcripts were transcribed, translated, and edited for clarity under a constructivist paradigm to ensure meaning retention. Coding was conducted in NVivo using pre-defined analytical categories derived from the literature, as outlined in **Tables 5.1** and **5.2** (presented below). This process allows for developing a theory that is both "grounded" within the data that is collected, while simultaneously being theory-driven (Alvesson et al., 2017; Gioia, 2021; Magnani & Gioia, 2023). First-order codes were developed inductively from participants' language and expressions, then grouped into second-order themes through constant comparison. I then iteratively grouped these codes into second-order themes and synthesized into aggregate dimensions that I developed, informed by both theoretical relevance and empirical coherence.

This approach would furthermore allow for the knowledge from the data to be arranged according to already existing theories for the purpose of extending them, as well as identifying critical areas that are not covered by the theory. This process was driven by **Figure 3** as illustrated in the synthesis section of the literature review section, which combined insights from the literature in order to draw and create new knowledge. As my thesis follows a constructivist approach, this process reflects my understanding of the theories as well as my application of them for the purpose of rigorous qualitative analysis. My abductive approach guided the coding process, blending theory-driven and data-driven codes to iteratively refine understanding (Dubois & Gadde, 2002; Saunders et al., 2009).

Below, I present a table of deductive codes for use in abduction for the purpose of empirical examination. These codes were derived from the literature review of the theories, i.e., they were derived a priori. I have used these theoretical codes for designing the interview questions for data collection, which are attached as **Appendix 2**, but since the interviews were semi-structured, my method added additional insight from the ground. By comparing the theory-driven codes with the data-driven codes that I derived from the interview data, I therefore combined both theoretical and empirical codes through this abductive process, thus adhering to my paradigm for abductive reasoning throughout the analysis process.

Table 5.1: Framework of theoretical codes to be used for analysis of RQ 1

RQ 1. **How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations in the textile industry?**						
Constructs	**Parameters**			**Circular Technology Innovation**	Internalization	Externalization
Organizational Capabilities	Coordinating (Teece et al., 1997)	Learning (Lazonick, 1991)	Reconfiguring (Teece et al., 2000)		-Internal Innovation -Acquiring or merging with external firm	-Accessing external technologies through partnerships
Sub-Parameters	- Information flow - Resource management - Decision-making	- Codification of knowledge -Diffusion of learning - Investment in R&D	-New process change -New technological change -Routine change			

Developed by author based on Teece et al. (1997), Teece et al. (2000), Lazonick (1991)

To operationalize the three organizational capabilities, namely coordinating, learning, and reconfiguring, I used a set of sub-parameters to guide my coding.

For coordinating capability, I coded for information flow, which refers to how communication is structured across departments and hierarchical levels, including whether knowledge is centralized, siloed, or freely shared. I also assessed resource management, capturing how firms allocate and reallocate their human, technological, and financial resources toward CI. Lastly, I examined decision-making, which denotes how strategic or operational decisions are made in practice, depending on whether these are centralized at the top or decentralized across functional units, and how authority is exercised in the context of innovation.

In the case of learning capability, the coding included codification of knowledge, which refers to whether learning is formalized in process guides, manuals, or standard operating procedures that allow for organizational memory and transferability. I also coded for diffusion of learning, which captures how knowledge (once gained through innovation or experimentation) is disseminated

throughout the firm. This includes horizontal learning across departments or vertical diffusion through training or leadership. A third sub-parameter was investment in R&D, denoting how much attention and resources the firm devotes to research and development efforts, particularly those that support or explore green technologies.

For reconfiguring capability, I identified three key indicators. New process change reflects whether new workflows, methods, or stages have been introduced in response to CI needs. New technological change refers to the integration of new tools, equipment, or digital systems intended to improve or enable CE innovation. Lastly, routine change captures modifications to habitual or day-to-day operations, such as adjusting production schedules or quality control processes, to better accommodate sustainability-oriented technologies or practices.

Table 5.2: Framework of theoretical codes to be used for analysis of RQ 2

RQ 2. How do institutional structures influence circularity innovation strategies within textiles ecosystems?					
Constructs	**Parameters**		**Circular Innovation Strategies (CIS)**	Process	Strategy
Institutions	Authority sharing (Soskice, 1999)	Organizational Careers (Whitley, 2003)			
Sub-parameters	- Leadership enabling - Delegation of authority - Hierarchical distance	-Bottom-up career paths -Long term Careers -Rotational careers	Sub-parameters	- Development through internal R&D -Purchase technology -Outsource to external firm -Acquiring technology/firm for internalized innovation	-Dependent -Craft-based -Responsive (Whitley, 2000)

Source: Developed by author based on Whitley (2000, 2003) and Soskice (1999)

To analyze how institutional structures shape innovation strategies, I coded for parameters related to authority-sharing, organizational careers, and strategic choice.

Under the dimension of authority-sharing, I examined leadership enabling, which captures whether top management supports bottom-up innovation, such as by fostering experimentation or removing bureaucratic barriers. Delegation of authority denotes the degree to which decision-making responsibilities are pushed down to mid-level or functional leaders, especially in innovation contexts. I also assessed hierarchical distance, which refers to how steep or flat the organizational structure is, affecting whether communication and initiative flow freely or are constrained by formal rank.

For organizational careers, I coded for bottom-up career paths, which reflect whether employees can progress in their careers based on initiative, skill acquisition, and knowledge creation, rather than only through seniority or formal promotion. I also identified long-term careers, which indicate the degree to which firms promote employee retention, knowledge continuity, and loyalty; factors that support the development of internal capabilities. Additionally, I examined rotational careers, referring to whether staff members are exposed to multiple departments or functions, thereby accumulating broader institutional knowledge and strengthening cross-functional capabilities.

In assessing innovation strategy types, I focused on how firms pursue circular innovation through internal or external means and through which strategy. Internal R&D development refers to the in-house development of new technologies, processes, or capabilities using the firm's existing knowledge base. Tech acquisition or partnerships captures instances where firms obtain innovation by collaborating with or purchasing solutions from external entities such as startups or universities. I also considered outsourcing, where firms delegate CE implementation to third-party service providers. Finally, acquiring technology/firm for internalized innovation refers to the strategic acquisition of another company, typically for the purpose of integrating their circular technology or innovation capabilities into the firm's operations.

3.3.2 Ensuring Rigor

Rigor throughout the process of the research was ensured via triangulation (Flick, 2004), where I cross-verified interview findings with secondary documents such as company reports. Furthermore, by continually reflecting on the researcher's influence on data interpretation, I ensured that the analysis process adhered to the research paradigm I have aligned myself with for the purpose of this thesis (Alvesson & Sköldberg, 2017).

3.3.3 Ethical Considerations

All participants were informed prior to the interview what the interview would be about, and consent was secured from all participants regarding recording the audio. Data confidentiality and anonymity were maintained throughout the study where requested.

4 Analysis & Findings

4.1 Overview of the Analysis

This section presents a comparative analysis of how organizational institutional structures shape the innovation strategies of supplier firms operating within circular textile ecosystems.

First, I present my findings on how internal organizational structures, namely authority sharing and organizational careers alongside institutional complementarity between firm goals and the broader institutional environment, influence the configuration of organizational capabilities. Then I present my analysis findings on how these organizational institutional conditions shape three core capabilities: coordinating, learning, and reconfiguring. These capabilities do not emerge in isolation but are structured by the institutional logics surrounding each firm. Third, I present my findings on how the configuration of these capabilities enables each firm to pursue a distinct innovation strategy: a dependent strategy in the case of DBL and a craft-based responsive strategy in the case of Fibertex.

Finally, I present how these strategies result in different forms of CIS, which are externally acquired and selectively internalized in DBL, and internally developed and incrementally refined in Fibertex. In doing so, I argue that institutional context is not merely a constraint or enabler, but a constitutive force that actively shapes how innovation is organized and pursued.

4.2 Organizational institutional structures shaping organizational capabilities in textile ecosystems

In this section, I present the results of my data analysis on how both case firms' institutional context and informal structures influence their CIS within circular textiles ecosystems. Then I explain how the institutional structures of Fibertex Personal Care A/S's home context enable the firm to choose

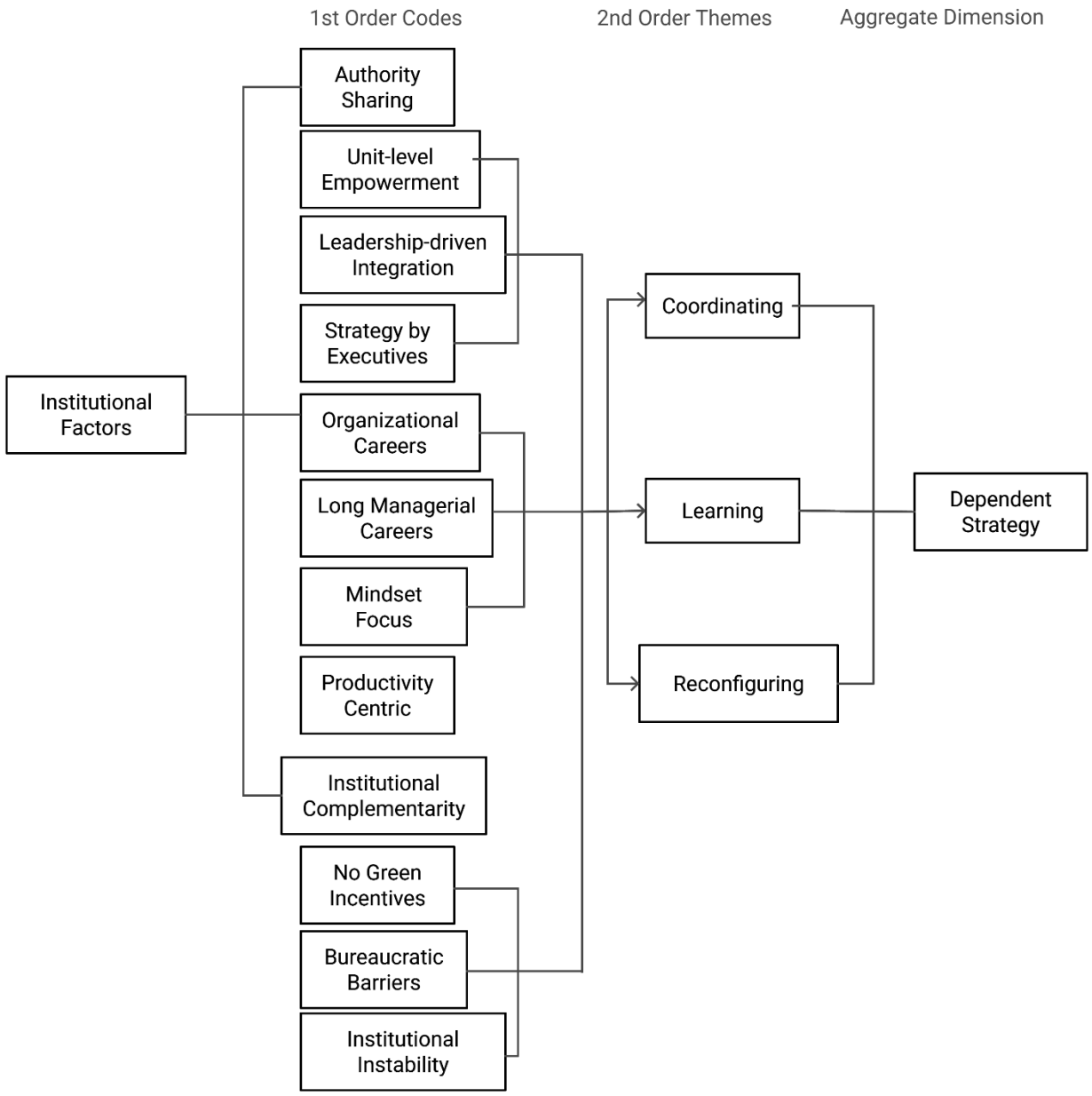
a strategy of craft-based responsive innovations, while the institutional structures of DBL Textiles' home context pressure the firm to choose a dependent strategy for innovation.

DBL Textiles is situated in Bangladesh, typically included in the global south, where the institutional conditions have been thus far characterized as underdeveloped or fragmented formal institutions, marked by regulatory uncertainty, limited state support for innovation, bureaucratic inefficiencies, and political instability. These conditions create a risk-averse environment that inhibits proactive strategic innovation and reinforces reliance on standardized, externally driven operational models (IFC, 2024).

Fibertex Personal Care A/S is situated in Denmark, typically included in the global north, where the institutional conditions have thus far been characterized as stable, well-developed, and supportive of long-term innovation. These conditions include strong regulatory frameworks, high levels of trust, comprehensive welfare systems, and institutional infrastructures that facilitate cross-sector collaboration and capability development (OECD OPSI, 2021).

Below, I present the Gioia codes derived from the analysis of interview data. I will follow the order in which the codes are illustrated throughout my presentation of the findings.

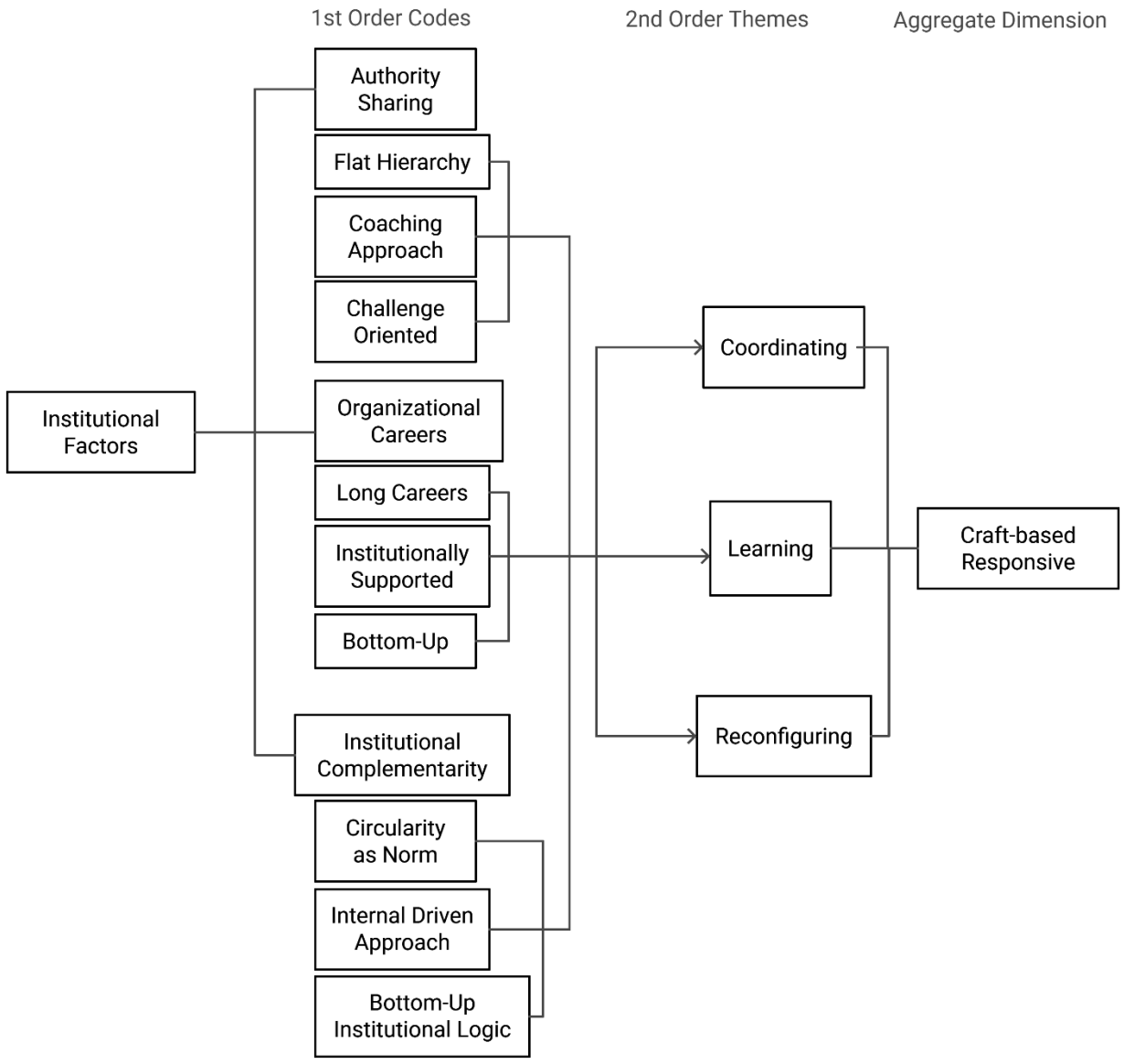
Figure 4: Gioia Codes for DBL Textiles



Source: Developed by author

Here, I present the abductive process codes I derived from the DBL Textiles interview data. It displays how organizational institutional factors, namely authority sharing, organizational careers and institutional complementarity build structure the firm's organizational capabilities of coordinating, learning and reconfiguring, which further determines the CIS the firm will follow. In the case of DBL Textiles, my analysis finds that the firm follows a dependent innovation strategy.

Figure 5: Gioia Codes for Fibertex Personal Care A/S



Source: Developed by author

Here, I present the abductive process codes I derived from the Fibertex Personal Care A/S interview data. It similarly displays how organizational institutional factors, namely authority sharing, organizational careers and institutional complementarity build structure the firm's organizational capabilities of coordinating, learning and reconfiguring. Despite finding similarities, especially in the learning capability of both DBL and Fibertex, I find that Fibertex follows the craft-based responsive innovation strategy due to differences in organizational institutional structuring.

I first present a summary of my findings in **Table 6**, then expand upon each section below.

Table 6: Cross-case comparison between Fibertex Personal Care A/S and DBL Textile's organizational institutional structures

Organizational Institutional Conditions	Fibertex Personal Care A/S	DBL Textiles
Authority Sharing	Managers encourage employees to organize their work by themselves	Bottom-up ideas are filtered through trustee board and top management discretion
Organizational Careers	Retains employees for a long time and moves them between departments to build skills	Retains managers for a long time but retention is based on results produced through narrow authority
Institutional Complementarity	Innovation at Fibertex is complemented as sustainability is culturally accepted and invited in Denmark	Lack of circularity related tax breaks, double taxation of recycling, lack of information communication in bureaucratic processes creates barriers for recycling initiatives

Source: Developed by author

4.2.1 Authority Sharing

DBL Textiles

DBL's authority sharing reflects a centralized leadership structure in which innovation is tightly coordinated through executive oversight. Authority is delegated to unit-level managers, but only within boundaries defined by senior leadership. Rather than enabling bottom-up strategic formation, this structure facilitates execution of predefined goals. Employees can manage localized operations, such as recycling, yarn development, or quality—but must "convince" the trustee board before initiating formal projects (D1). This approval-driven model aligns with a dependent

innovation configuration, where decision-making authority is held by a small leadership group. The result is implementation efficiency at the cost of flexibility and lateral experimentation.

My analysis finds that DBL operates under a system of contained strategic authority: while unit managers have technical autonomy, their decisions remain substantively dependent on executive approval. This structure supports operational consistency but constrains bottom-up innovation and reconfiguration speed.

Authority is not widely distributed but exists within trusted managerial silos. Managers handle local tasks and timelines but rarely shape broader innovation agendas. D1 and D2 expressed confidence in their ability to "handle their own domains," but this stems from delegated roles, not structural independence. The following quote illustrates the nature of partial delegation:

"*The decision is ultimately made by the board, but only after operations and senior leadership convince them. It's not the board initiating things — it's the employees and mid-to-senior leadership."* (D1)

Here, strategic proposals must gain trustee board approval before implementation, even if initiated by operational leadership.

Another feature of DBL's authority structure is its reliance on managerial leadership over institutionalized participation. Top executives set broad directions, secure board permissions, and initiate strategic projects—such as the recycling unit—through select managers (D1, D2). This ensures alignment with executive intent but limits experimentation. For example, the recycling unit emerged from D2's personal initiative, only gaining legitimacy after endorsement by the managing director. At DBL, strategic legitimacy flows downward, not laterally:

"*…even in top-down cases, there are situations where people approach the (trustee) board directly… They take feedback from our Innovation Head…"* (D2)

Here, D2 indicates that even when ideas originate from lower levels, they are filtered through top management before receiving executive action, reinforcing a leadership-driven governance model.

This culminates in what can be described as strategy by executives: DBL's long-term directions, particularly in circularity, are filtered through a narrow group of trusted leaders. Even when junior

employees or external actors generate ideas, executive endorsement is required for resource allocation. As D2 notes:

"*I still receive 100% support — especially when I present a convincing case to management…*" (D2)

While idea generation may occur broadly, authority and resource control remain centralized. The language of "presenting a case" implies a gatekeeping function where approval must be earned. This is further evident in the firm's 'Transformation 4.0' initiative:

"*We call it Transformation 4.0. It's easy to talk about — but very tough to implement, honestly speaking. We presented it: and I'll say, designing it was easy. We've already designed the transformation framework. But implementation is the hard part.*" (D2)

D2 highlights the difficulty of translating top-level designs into action, noting challenges in cascading strategic intent through the hierarchy.

Together, these findings point to a structure of contained strategic authority, where empowerment is granted for execution rather than strategic formation. DBL's informal institutional structure limits fluid authority sharing and lateral collaboration. Strategic action requires trustee board endorsement and is mediated by top management. This enables clarity and control under unstable institutional conditions but constrains flexible or emergent innovation. Authority at DBL is thus shared selectively, with strategic autonomy concentrated at the senior leadership level.

Fibertex Personal Care A/S

Fibertex is built on a foundation of empowered autonomy. Authority is dispersed through a flat hierarchy that emphasizes shared ownership over firm direction, treating employees as integral to the innovation process. This structure enables the firm to address complex challenges—such as the development of downgauged 5 GSM fabric—through continuous refinement and problem-solving rooted in existing capabilities. Innovation is framed not through rigid planning, but as a collaborative, iterative process grounded in mutual trust. Employees organize their work independently, with no formal prescriptions for how long to work on a given task (F1, F4). As one interviewee notes:

"*The best solution is created when someone is free to be creative."* (F2)

This culture of trust is actively reinforced. The flat hierarchy integrates managers and employees through shared responsibility for strategic and operational outcomes. As the CEO explains:

"*I never put up KPIs for anyone, they come with them themselves, I never put any KPIs up for them, they come with it, because they believe in this and are as, let's say, as responsible for the business as I am.*" (F4)

Here, responsibility is internalized across the organization. Rather than imposing goals, leadership relies on a shared commitment to the firm's purpose. This trust-based model extends across roles—from senior managers to machine operators.

Autonomy at Fibertex is supported through a coaching-oriented management style. Employees are encouraged to take responsibility for specific projects and client relations, with minimal oversight. As the R&D Director explains:

"*It's also important that each one (employee) is responsible for some projects and for some customers. And it's also important that they can decide what to do with the customer and the projects at one time. They don't need me or anyone to help them organize this, because that would create some dis-motivation."* (F2)

Autonomy is therefore both a structural and relational necessity—critical for maintaining buyer relationships and internal motivation. Employees are entrusted with workflow decisions and strategic alignment, minimizing friction between formal roles and initiative-taking.

"*My job is to make other people's job easier. That's how we see it.*" (F1)

This quote underscores the management ethos: leadership exists to empower, not control. This is further reflected in what can be termed the 'challenge approach', where leaders pose broad goals rather than prescribe specific actions. As the CEO describes:

"*So instead of a 10 GSM material, we could produce a 5 GSM material. This was the technological challenge that we gave to, let's say, our R&D folks. Okay, can you make a material like this that works?"* (F4)

Here, innovation emerges from shared problem-solving rather than top-down mandates. Employees contribute as co-creators, not just implementers, fostering a strong sense of shared achievement in meeting strategic challenges like the industry-first 5 GSM fabric.

Cross-Case Comparison

These contrasting authority models reflect adaptation to institutional risk. Fibertex's trust-based approach is sustained by Denmark's robust institutional safeguards, which lower the costs of failure and support decentralized innovation. In contrast, DBL operates under institutional instability and limited safety nets, necessitating centralized authority to manage risk. Authority sharing thus becomes innovation-relevant, shaped not only by internal design, but by the institutional environment in which the firm is embedded.

4.2.2 Organizational Careers

DBL Textiles

Organizational advancement at DBL is driven by measurable results rather than developmental learning or skill diversification. Long tenures function less as vehicles for capability building and more as stabilizing mechanisms within a firm focused on operational continuity. Employee integration is treated as a managerial responsibility, while innovation is framed as something unlocked through shifts in employee "mindsets," not through embedded capability development. Employees are evaluated on KPIs such as "increasing productivity" and "reducing imports," reflecting an institutional logic that links innovation to output, not learning.

My analysis finds that DBL's organizational careers follow a performance alignment logic. While many senior employees have been with the firm for decades, their roles and progression are defined by efficiency and output rather than cross-functional or capability-building trajectories. D2, for example, has been with DBL for nearly 20 years. As such, long tenures are common, but they serve continuity, not development. The firm actively balances respect for seniority with the integration of younger employees. As D2 explains:

"*So how do we achieve intergenerational integration? [...] It's the company's responsibility to integrate them — and also respect the contributions of previous generations*." (D2)

This quote underscores that tenure is valued for maintaining cohesion, not for enabling strategic voice. Integration is framed as top-down rather than participatory.

DBL also emphasizes mindset transformation, yet this remains aligned with future operational needs rather than internal learning cultures. As D2 states:

> "*Unless we change the mindset and improve the culture of people — which has no fixed boundary — we will not unlock the innovations of tomorrow."* (D2)

Here, attitude change is positioned as a precondition for innovation, but without mechanisms for employee-driven learning or initiative. Mindset shifts are mandated rather than emergent, reinforcing managerial control over bottom-up creativity.

This logic is reinforced by performance metrics grounded in operational output. My analysis finds that DBL prioritizes tangible results over internal efficiency. Hierarchical structures require trustee board approval for strategic execution, a process widely accepted within the firm as necessary. Employees are not fully trusted to execute strategic actions independently, as seen in the top managers' preference for oversight (D1, D2, D3). As D1 puts it:

> "*Right now, my main KPI is: increase productivity, reduce imports.*" (D1)

This puts emphasis on cost and productivity anchors employee evaluation and advancement, sidelining experimentation, cross-functional learning or strategic initiative. Advancement is achieved through immediate contributions, not long-term capability cultivation.

Taken together, these findings reflect an output-oriented career logic. DBL emphasizes loyalty, compliance, and measurable contribution, with long careers serving as continuity mechanisms in a system designed to maximize productivity under uncertain institutional conditions. Strategic innovation and experimentation remain secondary to operational output.

Fibertex Personal Care A/S

Fibertex's autonomy is sustained by long-term organizational careers, which preserve the knowledge, values, and technical capabilities necessary for incremental innovation. Career paths are typically internal and cross-functional, with employees progressing over decades (F1, F3, F4). This continuity fosters deep contextual understanding, stable team dynamics, and trust grounded in past experimentation—critical elements for managing technological uncertainty. These careers

are further supported by Denmark's institutional infrastructure: high wages, strong worker protections, and a comprehensive welfare system that reduce external pull factors and encourage long-term firm commitment. In contexts like Denmark—marked by low power distance and high employment security—careers tend to be long-term, internally promoted, and skill-development oriented (F1). This enables firms to retain talent and build innovation strategies around accumulated expertise.

At Fibertex, careers are defined by internal mobility and cross-functional development. Employees across all levels, including top managers, typically begin on the factory floor (F1). This shared trajectory reinforces a collective understanding of the business and cultural continuity across hierarchies. As the CEO explains:

> "*...we are all born here, I started also as an R&D project leader many years ago, and as many others in the company, you know, being promoted as we have grown in the company..."* (F4)

This quote highlights both the culture of internal promotion and the presence of structured career paths that anchor expertise within the firm. As employees rise through ranks and roles, they carry operational knowledge and a sense of ownership over the firm's development. All interviewees reported tenures between twenty and twenty-five years (F1, F2, F3, F4).

Externally, Denmark's institutional framework supports this continuity. Strong labor protections and high salaries create conditions where job stability is expected and incentivized. As the Operations Director notes:

> *"What we have in Denmark is, we have high salary cost."* (F1)

While typically viewed as a liability, high salary costs here contribute to low turnover. When wages, working conditions, and safety nets align, employees are more likely to invest long-term in a single firm. This allows Fibertex to build a highly specialized workforce with deep institutional memory—crucial for sustained innovation.

Internally, Fibertex reinforces these careers through a challenge-oriented management approach. Employees are not assigned routine tasks but presented with complex innovation challenges requiring initiative and cross-functional coordination. As the R&D Director describes:

"*We said, hey, how can we make a step change so that we really make a huge impact on the CO_2? And that's why we developed this 5 GSM fabric..."* (F2)

Here, innovation is framed as a shared technical problem, not a top-down directive. Employees contribute to visible outcomes, deepening their investment in the firm and allowing them to grow alongside it. These experiences evolve into personal career narratives tied to Fibertex's innovation milestones (F1, F2, F4).

Taken together, these elements form a deep capability anchoring. Fibertex retains talent not only due to favorable external conditions, but also through deliberate internal practices: cross-functional growth, institutional alignment, and a challenge-driven ethos. The result is a low-turnover, high-capability workforce with a shared cultural memory. Both the CEO and R&D Director have served over two decades, with similar patterns across leadership (F2, F4). This internal continuity underpins Fibertex's ability to maintain strategic coherence and sustain complex, internally developed innovation pathways.

Cross-Case Comparison

These differences in organizational careers again reflect institutional and sectoral divergences. Fibertex benefits from Denmark's institutional emphasis on vocational education, labor rights, and horizontal career development, all of which incentivize firms to invest in long-term employee capability building. DBL operates in a labor environment where rapid growth, export-oriented buyer pressure, and low-margin competition produce a logic of retention focused on output reliability. The product nature reinforces this: in nonwovens, minor process adjustments have led Fibertex Personal Care A/S to significant efficiency gains, making employee-level learning and internal movement highly valuable. In the cotton-based knit garments on the other hand, where process modularity is higher as it takes multiple steps in order for the firm to deliver a complete final product and technical decisions are pre-specified by buyers, the returns to cross-functional internal learning are comparatively limited.

4.2.3 Institutional Complementarity

DBL Textiles

This additional code emerged from the data through my abductive method. The analysis revealed that alignment, i.e., complementarity, between organizational institutional structures and firm-level goals for CE transition is critical for enabling complex circular innovation strategies. In this regard, Fibertex and DBL diverge sharply: Fibertex benefits from strong complementarity, while DBL operates with a lack of it.

DBL's institutional environment reinforces a fragmented capabilities structure. The Bangladeshi context offers little regulatory or financial support for circular transition. When DBL imported recycling machinery, it received no tax concessions because the equipment was classified as standard textile machinery. The absence of green-specific tax breaks or procurement incentives raises innovation costs and deters transformation. Even when financing mechanisms exist, procedural inefficiencies render them impractical. For example, green loans are so delayed that managers often prefer higher-interest conventional loans. These constraints force innovation to align with what is low-risk and immediately feasible. Political instability further exacerbates these conditions by undermining long-term planning and deterring forward-looking investment.

DBL thus operates in an environment that does not support—and in many ways discourages—long-term innovation in circularity. Although the firm has developed internal recycling and sustainability capabilities, these have been achieved despite institutional conditions, not because of them. The surrounding structures are defined by absent incentives, bureaucratic delays, and political uncertainty, all of which create a risk-averse climate that limits proactive strategic innovation.

A clear example is the absence of state-provided incentives for green innovation. When DBL imported fiber recycling machinery, it did not qualify for any green-related benefits:

"*...because these machines were classified as textile machines, not recycling equipment. There were no special incentives.*" (D1)

This illustrates how the lack of regulatory definitions for circular technologies prevents access to cost-saving measures. Firms are unable to distinguish themselves from conventional producers in the eyes of the state.

"*Currently, VAT still applies — even for green products. So we're treated like any conventional producer.*" (D1)

Despite producing yarn from pre-consumer waste, DBL is taxed identically to traditional producers. The absence of circularity-specific tax relief or exemptions not only obstructs innovation but actively discourages it by reinforcing the status quo.

These barriers are not only economic but also procedural. Accessing green finance is often unfeasible due to administrative bottlenecks:

"The problem isn't just access to information — it's the process. Even if you're aware, the bureaucracy is so lengthy. When you're pressed for funds, you'd rather pay 2% extra interest and get your project moving than wait months for green financing approval." (D2)

This quote highlights how inefficiencies in institutional processes force firms into short-term, suboptimal decisions. Even when green programs exist, they are structurally misaligned with the timelines and realities of circular innovation.

Finally, institutional instability compounds these challenges. Political turbulence makes strategic planning unpredictable:

"*Right now, though, governance is deeply problematic. People are out in the streets, and no one seems to have clarity. [...] The political climate is unstable, and that instability affects how we plan for the future — especially when it comes to investment and long-term decisions.*" (D1)

This instability undermines confidence in multi-year innovation efforts, as firms face the risk of abrupt policy reversals or paralysis in governance.

Together, these findings reveal a broader theme: institutional inhibition of circular innovation. DBL must innovate within a setting that offers minimal financial or procedural support and is further destabilized by political uncertainty. As a result, its innovation strategy is necessarily cautious, adaptive, and constrained—not driven by opportunity, but shaped by the need to work around systemic obstacles.

Fibertex Personal Care A/S

Fibertex's circular innovation goals are supported by its embeddedness in an institutional context that fosters experimentation and incremental learning. Sustainability and circularity are not external imperatives but cultural defaults. From early education through to workplace practice, employees are socialized to take initiative, collaborate across functions, and treat environmental responsibility as a given. This cultural-institutional complementarity enables Fibertex to pursue innovation without friction—regulatory or internal—and supports bottom-up contributions, such as operators redesigning workflows or line managers deferring to shop-floor expertise.

Circularity at Fibertex is not framed as a policy response but as an extension of embedded societal values. In Denmark, environmental awareness, egalitarianism, and collective responsibility are reinforced from an early age and carried into the workplace. As the Operations Director explains:

> *"I think that it's because of the way we are as people or as a culture in Denmark... Already from public school, we are trained in working together to solve the task... That's a competitive advantage from, not from Fibertex, but from people in Denmark that we are used to work together. To solve the problem."* (F1)

This quote underscores how the national context primes employees for collaboration and sustainability, shaping organizational routines around shared cultural norms rather than imposed directives.

Fibertex's innovation strategy is further reinforced by internal leadership. The CEO's commitment to sustainability is described not as a corporate responsibility, but as a personal imperative:

> "*The reason why I'm so, let's say, engaged into it is also a more personal thing rather than a company thing... I am personally very much, you know, this overconsumption thing. Because we are heating the globe and we are not reacting*." (F4)

Here, sustainability is led from within. The CEO's values guide strategic direction, independent of regulatory pressure. This internal motivation diffuses downward, shaping firm-wide innovation routines.

Fibertex's decentralized authority structure reinforces this orientation. Decision-making is pushed to those closest to production, with line managers explicitly instructed to rely on operators' knowledge. As the Operations Director notes:

"*One of the things that we have done is that the line manager should not draw this drawing. The line managers should go to the operator and say we have to do this and then the operator will draw the drawing and explain what to do — then it's more like bottom up*." (F1)

This approach embeds innovation in day-to-day operations. Rather than flowing from top-down mandates, ideas emerge from practical engagement on the shop floor.

Together, these patterns reveal how Fibertex's innovation capability is embedded in a system of cultural-institutional complementarity. Circularity is normalized, autonomy is structurally enabled, and leadership acts as both initiator and facilitator of capability development.

Cross-Case Comparison

In light of these findings, the strategic divergence between Fibertex and DBL becomes clearly institutionally grounded. Fibertex and DBL follow institutionally coherent but structurally divergent innovation strategies. Fibertex draws on empowered authority structures, cultivates long organizational careers and strong institutional complementarity to incrementally refine its processes and maintain strategic differentiation. DBL, by contrast, adapts its structure to accommodate institutional constraints, relying on centralized authority, output-driven employee retention, and cautious, selective investments. These distinctions underscore that institutional environments are not only external contexts but also constitutive forces that shape how innovation is organized, prioritized, and enacted within firms.

4.3 Variable Organizational Capabilities Shaping CTIs in Suppliers

In this section, I present the results of my data analysis on how both case firms' organizational capabilities shape their ability to either internally develop or externally acquire circular technology innovations in the textile industry, i.e., which type of CTI strategy the firm's organizational capabilities allow them to pursue.

Fibertex Personal Care A/S is one of the largest suppliers of nonwoven fabrics designed for use in hygiene-related products. They supply to US-based Procter & Gamble (P&G), the Sweden-based buyer Essity, Belgium buyer Ontex and the Danish Abena (F3).

DBL Textiles is one of the largest knit apparel manufacturers and exporters in Bangladesh, whose top buyers are the UK-based Walmart-George, the Germany-based Puma, the USA-origin Esprit, and Netherlands buyer G-Star (D2). **Table 7** presents the ideas I found through my analysis in brief. I will further expand upon them below.

Table 7: Cross-Case Comparison of Organizational Capabilities between Fibertex and DBL

Capability	Example from Fibertex Personal Care A/S	Example from DBL Textiles
Coordination	Experiments with energy-saving process changes and reusing pre-consumer plastic waste to reduce wastage and costs	Strategy for recycling required alignment with Managing Director and Trustee Board before implementing mechanical fabric recycling
Learning	Working extensively with buyers to learn preferences, about their machines and matching their product so their buyers can process the fabric	Works closely with buyers to understand preferences but only invests in projects that are confirmed to yield investment returns, such as confirmed contracts with buyers like Puma
Reconfiguring	Increasing spinbelt speed, reducing the number of extruders in use for future weight reduction	Established sister firm for recycling fabric waste due to lack of internal capability and barriers for external recycling

Source: Developed by author

4.3.1 Coordination

DBL Textiles

My research finds that DBL Textiles' coordination capability strategy can be described as a hierarchical method of strategy execution, where any strategic execution of a plan requires trustee board approval, and thus must move upward through appropriate hierarchical channels before it can be implemented.

I observed that this coordinating capability can be characterized as a form of distributed top-down planning, where there is a strong reliance on centralized leadership in the form of ideas being integrated by the managerial layer, and feedback is filtered through the top managers as well. My data analysis reveals that strategic decisions in DBL tend to originate close to the top, driven by the execute heads of a given department, then cascade downward through structured integration mechanisms and planning. This idea is best exemplified by the following quote.

"So we need to start preparing, but with caution. [...] If I tell management, 'Let's expand into home textiles,' they'll seriously consider it…" (D2)

This suggests that when long-standing managers pitch ideas with higher confidence, top management is more inclined to approve strategic action. Home textiles were used as an illustrating example for how much leadership autonomy D2 possesses. This indicates that while lower-level employees participate in innovation implementation, the initial direction and pace are typically determined by senior executives or board members (D1). Decision-making around technological investment, such as open-end spinning or internal recycling units, follows a model where senior leadership sets the vision and provides the resources, but implementation remains rigidly monitored.

For example, interview data from DBL highlights how the managing director's endorsement was required to scale a recycling initiative from one pilot machine to four full lines. This rapid scaling was framed as an economic imperative rather than an experimental pilot, emphasizing the firm's preference for confident, hierarchical commitments over iterative exploration (D1, D2, D3). At the same time, while feedback loops exist between operational managers and the board of the firm, they remain filtered and structurally cautious, limiting the emergence of bottom-up strategic shifts.

In order to meet buyer requirements, DBL has internally established a spinning mill where fibers are recycled mechanically. Here, another aspect of DBL's coordination is revealed, in how centralized the control of production and resources is, as it remains typically in the hands of the top management. The following quote summarizes this idea.

"Recycling is under my control, so I know there is a huge struggle. But if I can manage both spinning and recycling, then we can develop both sides together. [...] If we were to involve a third party or separate management, I think it would create complexities in coordination and oversight. That's why I prefer to work this way." (D1)

Here, D1 refers to how the recycling section is under his direct supervision, and he ensures that quality is maintained through monitoring. This reflects an aversion to uncertainty, managed through tight control of operational processes. Here, the involving of a third party may complicate matters, as that third party requires additional monitoring and guiding in order to produce the quality D1 needs for DBL Textiles' buyer requirements. As such, rather than taking any risks, DBL prefers to establish its own unit for recycling fabric.

The desire for a transition towards using pre-consumer waste fabrics initially began as a curiosity, D2 notes, with the aspiration being shared by the Managing Director of DBL Group. This alignment with the top management of the firm allowed support to form for the idea and for the mobilization of resources towards realizing it. The following quote exemplifies this idea.

"We had a dream of establishing a separate company — still under DBL's control — for recycling and spinning. Our MD (Managing Director) and the sustainability team have been involved in this unit." (D2)

This quote indicates that there is a tacit requirement for an idea to be legitimized in the eyes of the top management before resources can be deployed towards them. It also indicates the ideation process is further constrained to a narrow set of senior managerial actors, especially those who have been present with the firm for a long period of time.

D2 further expresses how he has been in the firm for over 20 years, indicating that there is a necessity for ideas to come from seniority within the firm, as the longer the actor's career, the more likely the top management may be to trust the ideation process of the actor providing any idea for

change. Furthermore, this trust-based resource deployment is indicated to be selective, which D2 elaborates upon in the following quote.

"To be honest, I still receive 100% support — especially when I present a convincing case to management. As long as I have their (Trustee Board) trust and confidence, things move forward." (D2)

The quote indicates that D2 receives a greater degree of support, i.e., a willingness by the trust board to deploy financial, logistical and time resources towards ideas he presents, which further indicates that there is a selective deployment of resources based upon the degree of seniority and career output of the actor who is proposing the idea for change. Furthermore, my analysis found that DBL Textiles has been expanding continuously since its inception (D1, D2, D3). This coordinative drive towards expansion signals a need for control, which further underlies the case firm's desire to retain control and only expend resources towards select strategic actions that align with the top management's visions.

Fibertex Persona Care A/S

Fibertex's coordination capability is diffused throughout the organization in a way that empowers employees to seek newness by themselves. Authority is dispersed and oversight is limited, as it is expected that employees will handle and organize the work in a way they feel is most efficient and effective. Employees are allowed to be creative.

My data analysis finds that coordinating in Fibertex Personal Care A/S can be characterized as an internal, embedded drive in sharing knowledge between roles, especially between buyers and their personnel, whose main purpose is to adopt a greater degree of circularity. This means that Fibertex's managers coordinate routines, practices and production processes in a way that considers sustainability and circularity to the greatest extent possible without losing competitiveness. The following quote from the CEO exemplifies the idea behind Fibertex's coordination of knowledge-sharing.

"Everyone knows, we all know how to treat a customer, we all know how to deal with a claim, we all know how to... if there comes some legislation, or if we are polluting anything, we all know this is a no-go. So this is not a question whether I think we should pollute or not, this is not how we do it." (R4)

This quote indicates that knowledge, when pooled, is shared across the organization, as all personnel explicitly know how to treat customers, how to handle claims, and also understand when legislation is made regarding pollution, which specific process may be causing it and already begin developing ideas on how to reduce pollution. This further indicates an internal alignment of goals and values across the organization. Coordination activities in Fibertex Personal Care A/S also extend beyond knowledge sharing, and into coordinating processes related to both innovation and production, between both different departments as well as external entities, such as machine builders from other firms. The following quote from the Operations Director illustrates this idea, which refers to the managers coordinating with the external engineers of Recofil in order to upgrade their spunbond and spunmelt fiber production lines (F1).

"Together with the machine builder…. Yeah, we did that. We did a development together with them." (F1)

This indicates that managers also coordinate activities in order to achieve greater efficiency in their production, such as having external engineers come and helping them upgrade certain parts of their machines, which they have made fully modularized so that the spunbond machine can be upgraded or replaced part by part (F1).

How the innovation processes are coordinated is intrinsically tied with the coordination of production processes, where introducing newness to the present production model at Fibertex is an inclusive part of the whole process. This is done by making teams cross-functional, where employees begin on the machine line, then can rotate into managerial positions in order to understand if they are facing any bottlenecks due to operational differences or if there is a more efficient method to do the work they are currently doing (F1). Furthermore, I find that there is a great degree of communication between different functional departments of the organization. This idea is best illustrated with the following quote.

"So instead of a 10 GSM material, we could produce a 5 GSM material. This was the technological challenge that we gave to, let's say, our R&D folks. Okay, can you make a material like this that works? [...] The organization was working on this 5 GSM, different attempts, bringing it to the customers, testing it out, and so on and so forth." (F4)

The above quote exemplifies the idea of cross-department coordination, where the CEO frames his 'pitching of the idea' of a 5 GSM fabric to the R&D department for producing and testing as a collaboration rather than an order. These ideas are built upon the central idea of firm's pursuit for circularity, best exemplified by the following quote from the CEO.

"Never let waste be waste." (F4)

The desire for circularity within Fibertex is influenced both by the managers' personal desire reducing waste, for reducing 'excess plastic production' in the world (F4), informal institutions regarding recycling and resource consumption in Denmark, and EU regulations regarding circularity and the reduction of CO2 production and waste. As this sentiment runs deep within the identity of the firm's managers, it can be used to tie up these separate coordination processes under a single idea, which is introducing circularity into the production system.

Cross-Case Comparison

The difference in coordination models reflects differences in institutional contexts and organizational logics. Fibertex benefits from Denmark's high-trust institutional context and stable regulatory structures, which enable authority to be dispersed throughout the organization without significant risk. Top management believes that employees will be able to organize their work and move towards firm targets. DBL, situated in Bangladesh's volatile institutional context, operates under higher market uncertainty and weaker formal institutions, necessitating central control and deliberate filtering of strategic initiatives. Furthermore, the differences in product architecture also shape these patterns: Fibertex's nonwoven production allows for fluid technical adaptation across functions, while DBL's knit garment assembly requires tight sequencing and quality control under high-volume, client-dictated contracts.

4.3.2 Learning

DBL Textiles

DBL employs the same kind of learning as Fibertex but does so to orient themselves towards buyer's wants and needs and keeps it within that domain. They work closely with buyers to understand their needs in order to tailor products to buyers' requirements. However, they view rigid control over the production process as necessary to control standardized quality.

I found that the learning capability of DBL can be described as a tightly controlled, top-down process of exploration where newness is selectively embraced, and new ideas are cautiously tested before being scaled. Rather than embedding experimentation deeply into operational routines, DBL treats learning as a guided process where leadership filters, frames, and gradually integrates change to ensure strategic consistency and cost containment due to resource constraints and market uncertainties. This means that DBL's learning strategy can be characterized as a cautious and targeted form of learning, where the case firm employs a great degree of caution towards changes that may not provide enough returns on investment.

A key aspect of this learning posture is the firm's focus on enabling a mindset shift that accommodates generational and cultural changes, while still preserving organizational control. D2 notes the importance of creating a system that is responsive to new perspectives emerging within the firm:

"Right now, many of our interns and junior executives are from Generation Z. They're creative. We don't just want to use them—we want a platform where ideas from them can enter the system and be carried forward. But we need structure, or it turns into chaos." (D2)

This quote indicates that while DBL values fresh ideas, their integration into the firm is mediated by structure and control. The management recognizes the potential of generational creativity but seeks to domesticate this creativity within a stable framework, reinforcing the firm's learning posture as strategically open yet structurally cautious. It also indicates a reliance on currently present hierarchical structures and power distances. D2 says that this integration should not come at the cost of the 'older generation's voices', indicating that the informal institution of power distance between different age groups influences how DBL structures its learning capability.

The firm's cautious approach is also evident in its use of stepwise experimentation, particularly in how DBL initiated its recycling program. According to D2, the project began out of personal curiosity, using the cotton bale covers that came with imported raw cotton from an Australian producer. These were mechanically shredded and blended with virgin fibers to create new yarns. From considering fiber length to how it could be spun into yarn, the idea developed slowly, step-by-step, but it did not work out as intended (D2). However, this led D2 to consider using pre-consumer waste instead of the bale covers, indicating that there was a preference towards familiar, home-knit materials instead of breaking down foreign-made materials.

"Around 2014 or 2015, we began collecting red-colored fiber from our CMT waste… We started with 5%, then 10%, then 15%, then 20% (blend). We got results, but they weren't marketable. The quality wasn't good enough to present." (D2)

This quote illustrates that the recycling initiative did not emerge fully formed but evolved through repeated low-risk trials. The instability of quality in early stages made DBL reluctant to commit large resources until a viable blend ratio was found. This approach reflects the firm's deliberate mitigation of risk through incremental exploration.

In addition, my research found that DBL engages in ecosystem learning, particularly through strategic collaboration with its buyers. Managers at DBL maintain a strong relationship with its buyers, collaborating with them, learning from them and understanding their needs and wants in order to deliver the quality necessary. An example of this is DBL's long-standing relationship with Puma, which has yielded both technical guidance and commercial alignment:

"We've had technical collaborations too — like with Puma. One of their technical heads has been sharing innovative ideas with us for five years. We've done the same. We check the alignment. When it works, we execute. In fact, I've just closed a large deal with Puma. It will require around 4,000 tons of yarn, with 20% recycled content — including some recycled polyester." (D2)

This quote shows how DBL uses buyer collaboration not only to meet external expectations but to co-create product innovation in a way that aligns with internal strategic capabilities. Rather than following market trends blindly, the firm collaborates with ecosystem actors to find shared ground before proceeding with implementation.

Taken together, these examples, ranging from generational mindset shifts to structured experimentation in recycling, to ecosystem-based buyer collaboration, highlight DBL's learning capability as a cautious and targeted form of learning. Change is not rejected, but carefully piloted, evaluated, and scaled only when alignment with strategic priorities and managerial oversight is assured. The firm does not rely on embedded routines to drive innovation but instead utilizes a selectively open framework that permits experimentation within well-defined boundaries.

Fibertex Personal Care A/S

Fibertex's learning capability is oriented towards understanding and aligning with buyers as well as competitor firms but also uses the learning capability to create a future competency that enables the firm to have a competitive edge over other firms. Furthermore, since organizational careers are longer and cross-functional at Fibertex, the firm retains know-how inside for the long term, thereby allowing the firm to leverage long-term skills to build upon existing foundations and incrementally innovate towards the firm's goal for sustainability.

Learning at Fibertex Personal Care A/S is characterized by an incremental, hands-on approach rooted in experimentation. This sentiment is driven in a loose top-down way by the CEO, as exemplified by the following quote.

"When we started, we had very basic ideas on how to manage sustainability. And now [...] in all the new product developments that we are making, there is this 'but it's also downgauge-able in the future.' That's already built into the way we think." (F4)

When managers at Fibertex Personal Care A/S begin to solve a problem, they approach it from scratch, like managing sustainability. Managers learn by doing, using each experiment to refine production processes and embed knowledge into routine operations. As the CEO notes, the employees ensure that the fabric is further downgauge-able in the future, and this idea of thinking about the future while learning is embedded into the managers' routines.

"...really use our existing equipment in a clever way... not remodify the whole machine, but rearrange a little bit." (F2)

This quote from the R&D Director illustrates the thinking behind the learning capability of Fibertex Personal Care A/S, where they see the equipment as tools which they can rearrange in order to improve efficiency of their processes.

I further observed that Fibertex Personal Care A/S participates in an incremental method of experimentation, wherein the managers proceed one step at a time rather than make disruptive changes to the production process. The innovation of going down from 25 GSM to 5 GSM was not a fast or sudden shift, but rather a process that took years of experimenting and slowly

downgauging from a higher weight basis to a lower one, step by step. The following quote illustrates this incremental change.

"That has typically been one gram per square meter every three years or something like that. But now we said, hey, how can we make a step change so that we really make a huge impact on the CO_2? And that's why we developed this 5 GSM fabric [...] it's still half the basis weight." (F2)

The above quote from the R&D Director shows how the learning process at Fibertex Personal Care A/S is a stepwise process, where they tried to learn how to downgauge 1 GSM every three years, until they had reached 5 GSM. There was no new technology or process that was bought in order to disrupt the current production process. Instead the innovation was incremental, taking place step by step over time, but in a manner that made an impact on the goal of reduction of CO2 emissions by Fibertex.

The firm's learning capability also extends beyond its internal boundaries, encompassing not only Recofil, their machine suppliers, but also their own buyers such as P&G and Essity. My data analysis finds that Fibertex Personal Care A/S learns extensively about their buyers and their preferences, listening carefully to their needs and wants before introducing newness to their production process in order to best accommodate their buyers. This is best exemplified by the following quote.

"When we design new products, [we make sure] this can convert on a real machine. Because we can do so many fancy stuff, but if you cannot put it on a roll and run it through a machine, then it has no chance." (F2)

This quote indicates that when designing new types of fabrics, the R&D department ensures that they understand their buyers' machines well enough to design a product that the buyer can then process easily. As stated in the previous section, due to their relationship with Recofil, they also perform modular upgrades to their spunbond and spunmelt machines. Taken together, these examples show that Fibertex actively learns from its broader ecosystem context, working closely with both upstream suppliers for machine components, as well as downstream buyers and processors of their fabrics. Taken together, these examples reveal an embedded learning culture at Fibertex, which is experimental in nature, cross-functional in execution, and distributed across its ecosystem context.

Cross-Case Comparison

Institutional constraints play a significant role in this divergence of learning capability for the case firms. Denmark's public investment in R&D, supportive labor protections, and vocational education structures allow Fibertex to absorb learning risks and distribute innovation responsibility across the organization. In contrast, DBL must contend with limited institutional support for innovation, high financing costs and unpredictable policy implementation, making investing time and resources into expanding their learning capability where it may not be guaranteed to provide a return on said investments comparatively riskier. Furthermore, knit garments, composed mostly of cotton, are materially more complex to manufacture and recycle than nonwovens, where the former cannot easily be reduced to fiber form using heat-based processes unlike spunbond and spunmelt fabrics at Fibertex, reinforcing DBL's emphasis on risk-mitigated learning aligned to external contracts. This means chemical and mechanical recycling, the former of which has been established to require extensive and continuous investment, are more viable for DBL, which is why they opted to use mechanical recycling to meet buyer demands, despite it reducing fiber quality and strength in the process.

4.3.3 Reconfiguring

DBL Textiles

My research finds that DBL Textiles' reconfiguring capability is structurally reactive rather than strategically proactive. Rather than initiating change to lead market transformation or explore innovation frontiers, DBL adapts its internal structures primarily in response to external pressures—such as buyer expectations, regulatory constraints, or internal inefficiencies. Reconfiguration is pursued not as a vehicle for disruptive innovation but as a means of stabilizing operations, minimizing risk, and maintaining control. For instance, the internalization of recycling processes was not driven by a commitment to advancing circularity, but by a desire to preserve quality standards and avoid the institutional and financial burdens associated with outsourcing. Structural realignments are thus framed less as innovation pathways and more as pragmatic adjustments aimed at preserving scale and minimizing vulnerability.

One major driver of structural change within DBL is buyer-induced adaptation. While the creation of the recycling unit of DBL was initialized by D2 through personal curiosity, it was developed

further due to incentives being present in the market, as there was a global rising demand for textiles made using recycled fibers. However, instead of engaging with external partners to fulfill these demands, such as outsourcing recycling to a separate firm, DBL instead chose to internalize the function. This internalization was not driven by a desire to innovate freely, but to reduce the coordination and monitoring costs of involving third parties. As D1 explained:

"One issue is contamination. That's why I stopped collecting from external sources. We made this decision consciously. [...] That's why I restricted sourcing to internal waste. The sourcing team works only with RMG and spinning waste, which are under my control. This makes operations easier." (D1)

This quote demonstrates that reconfiguring at DBL is grounded in minimizing external dependence. The desire to internalize is less about developing new competences and more about maintaining quality control, oversight, and operational efficiency under increasing buyer demands for quality maintenance. The firm responds to external demands not by opening itself to collaboration, but by pulling responsibilities further into existing chains of command.

Another prominent instance of reconfiguration lies in DBL's broader Transformation 4.0 initiative, a formal roadmap aimed at future-proofing the organization through changes in governance, recycling, energy use, and leadership development. However, this transformation does not reflect an experimental approach to structural change. As D1 remarked:

"We call it Transformation 4.0. It's easy to talk about — but very tough to implement, honestly speaking. We presented it: and I'll say, designing it was easy. We've already designed the transformation framework. But implementation is the hard part." (D1)

This quote underscores that while DBL has invested in structural transformation as a concept, it unfolds in incremental phases, following predesigned frameworks rather than emergent discovery. It reflects the firm's preference for structured execution over adaptive experimentation. Transformation 4.0 is not an organic reimagining of the organization, but a phased, leadership-driven rollout managed to limit disruptions and safeguard stability.

A third mode of reconfiguration within DBL involves an acquisition-led change. As seen in its approach to recycling, DBL did not develop proprietary circular technologies through R&D. Instead, it acquired or internalized pre-existing external technologies through import, then built

dedicated units around them. This reflects a logic of procurement rather than creation, where DBL bypasses the uncertainties of developing something new and disruptive by absorbing solutions into its structure. Such acquisitions are prompted not only by strategic rationale, but also by institutional incentives, including avoiding double taxation on recycled materials and qualifying for future green loans. This reinforces that reconfiguration at DBL is triggered by constraints and contingencies, rather than proactive vision. The following quote exemplifies this idea.

"Currently, VAT still applies — even for green products. So we're treated like any conventional producer." (D1)

This indicates that if DBL were to sell its pre-consumer fabric waste to an external firm in order to have them recycle it into fiber, then DBL would be taxed twice under the law, once on the sale of the fabric, and once again for the buying of the recycled fiber, greatly increasing costs of recycling fibers. This legal institution creates an obstacle towards circularity that DBL solves by establishing an internal unit for recycling their fabric waste.

Collectively, these themes reflect a reactive reconfiguring capability. Structural changes at DBL are enacted not to lead innovation, but to defend organizational resilience under pressure. Whether through buyer-driven internalization, the stepwise implementation of transformation blueprints, or the acquisition of circularity technologies, DBL demonstrates a form of strategic adaptation that is cautious, contained, and conditioned by external circumstances. As such, DBL Textiles is structured towards realigning capabilities with external demands. It is a reactive position.

Fibertex Persona Care A/S

Reconfiguring capability at Fibertex reflects a proactive orientation toward proactive process innovation. The firm has consistently implemented process-level modifications to reduce resource intensity and carbon impact; lowering suction blower RPMs, for instance, by 100 RPM across production lines, as well as reducing the number of extruders in use from eight to five, contributing to an overall annual reduction of 2.5 gigawatt hours of energy. These adjustments required no capital investment, only the organizational ability to identify and implement efficiency opportunities. Similar changes have been made in the extrusion process with the speed of the spinbelt to accommodate thinner fabrics, balancing performance with material minimization.

At Fibertex Personal Care A/S, I observed that the reconfiguring capability can characterized as a way of adapting further process efficiency. This means that Fibertex Personal Care A/S prioritizes cost efficiency alongside sustainability, where they improve upon their production processes, such as reducing the RPM of their suction blowers to reduce electricity costs, increasing spinbelt speed to increase production speed, reducing the number of extruders they use at any given time in order to switch between them when one or more need maintenance. The following quote captures this core drive behind Fibertex's internal reconfiguring.

"*You need to demonstrate you can run at the same efficiency and the same cost, or even preferably lower cost to be able to have a success."* (F2)

This indicates that for Fibertex Personal Care A/S, cost reduction is a priority, and the employees are open to reorganizing how they work to minimize costs throughout the organization. This idea forms one of the backbones of Fibertex's reconfiguration capability, taking the form of a tendency to go towards shifts for production efficiency while simultaneously prioritizing their circularity goals.

My data analysis finds that Fibertex Personal Care A/S constantly updates its production processes in small, incremental steps; changes in the process that may be termed as 'rewiring', implying how the steps taken are small in scale, but drastically change the output of the process. A clear example of this is how Fibertex management optimized their spunbond and spunmelt machines in order to bring greater stability and efficiency in the process. The following quote makes this apparent.

"…we have also optimized the speed from, I think it was bought for 350 meters per minute, and then we internally upgraded to 630 meters per minute, which enabled us to utilize the spinning capacity of this machine with the new speed of the spin belt, making a stable process, actually." (F1)

This quote establishes the nature of Fibetex Personal Care A/S as being structured towards accepting incremental change. As explained before, Fibertex Personal Care A/S uses modular machines for producing their spunbond and spunmelt fabrics. The polypropylene granules that are stored in large silos are first transferred through a component known as 'extruders', where they are melt down using electric heating and blown down onto a moving belt called the spinbelt, where they are uniformly dispersed into weblike structures using the turbulence of cold air, after which

they are rolled and flattened into fabric, which are further rolled into large jumbo rolls that are supplied to buyers. In order for Fibertex Personal Care A/S to go from the commercial lowest 8 GSM to 5 GSM, the processes needed a 'rewiring'. The prime example of this rewiring is that of increasing the speed of the spinbelt, from 350 meters per minute to 630 meters per minute. This was a total increase of 280 meters per minute increase, allowing Fibertex to produce fabric more quickly and efficiently (F1). This rewiring for cost reduction, while not a fundamental change, clearly displays Fibertex's desire for reconfiguring as needed for creating room for innovations.

Another cost-reduction based change within Fibertex is how they reduced their energy consumption by 5% per year through a rewiring of their already-present production process, where impact is felt. It was done through changing a vital step in the production process, which the following quote illustrates.

"So we reduced the suction blowers with 100 rpm and we were able to run actually all six weeks and we are never increasing the suction blows again." (F1)

Suction blowers are the 'blowers' that force the newly placed fabric to stick to the spinbelt, as they are slippery upon first being formed. On the other hand, while increasing the speed of the spinbelt allowed for more efficient production, the reduction of suction blowers, from an initial 1,500 RPM to 1,400 RPM caused no change to the production process nor did it negatively impact the end product, it affected Fibertex's annual energy consumption massively.

The impact of this rewiring, alongside an additional extruder change where they run only five co-extruders instead of eight, caused an 80% decrease in Fibertex's pre-consumer waste, as well as an annual 5% decrease in electricity costs (F1). Before the year 2022, Fibertex Personal Care A/S consumed around 50 gigawatts of power per year (F1). However, after making both the spinbelt speed and the suction blowers change, the electricity consumption came down to 47.5 gigawatts, a reduction of 2.5 gigawatts. This indicates that Fibertex follows an impact-driven innovation style, where they adopt incremental 'rewiring' of their production processes that will allow for the greatest impact in the future.

Cross-Case Comparison

These reconfiguration patterns are shaped by the interplay of organizational institutional constraints and even product materiality. Fibertex's institutional context rewards incremental

innovation and supports long-term transformation goals, enabling the firm to reorganize internal resources autonomously. DBL's context lacks such systemic support, and reconfiguration becomes a tightly controlled managerial response to external frictions. Moreover, while nonwovens are easy to recycle due to being able to electrically heat and melt them back into polypropylene fibers. This means they can be efficiently reprocessed under controlled conditions. On the other hand, DBL's cotton-based knit garments are significantly harder to recycle, requiring multiple treatments and offering little scope for internal process reconfiguration without disrupting line performance or quality standards.

4.3.4 Circular Innovation Strategy: Dependent

DBL Textiles follows a dependent innovation strategy, characterized by responsiveness to external pressures, reliance on established technologies, and selective adaptation of known methods to meet buyer or regulatory demands. Innovation is not pursued as a participatory or exploratory process, but rather as a top-down directive. Strategic authority is concentrated in mid-to-senior leadership, while executional autonomy is granted only within predefined limits. Ideas must gain approval from top management and ownership before implementation, reinforcing a hierarchical logic of dependency. A new unit dedicated to mechanical textile recycling was established only after alignment with the Managing Director and the trustee board. While the strategy originated from the managerial level (D2), it needed to be filtered through both the top management and the owners of the firm before resources could be deployed towards the establishment of this new textile recycling unit. Simultaneously, this process is normative within the firm, whereby it is accepted by the employees that their ideas will need to gain acceptance from the top management and the owners of the firm before any idea can be put into motion Rather than aiming for transformative or internally driven innovation, DBL organizes familiar product attributes and processes within industry-standard frameworks, focusing on incremental adaptations rather than disruptive change.

4.3.5 Circular Innovation Strategy: Craft-based Responsive

Fibertex Personal Care A/S pursues a craft-based responsive innovation strategy. This strategy is defined by continuous, low perceived risk innovation efforts that refine product and process capabilities in ways tightly integrated with both client needs and long-term competitiveness. The firm's downgauging initiative, reducing product weight from 25 GSM to 5 GSM while

simultaneously commercializing a 7 GSM variant, illustrates this approach. This incremental innovation reflects is neither routine-breaking nor simple replication, but a targeted and proactive adaptation aimed at cost reduction and function optimization. These innovations are process-led and arise from within the firm's existing knowledge base, without reliance on imported technological solutions or one-off projects.

4.4 Resulting Circular Technology Innovation

The outcomes of each firm's innovation strategy reflect their organizational institutional conditions.

For DBL, the result was the establishment of a separate, recycling-focused company under the DBL Group umbrella. This unit was created to facilitate mechanical recycling of fabric waste—an initiative made necessary due to multiple internal and external obstructions to circularity. These included limited in-house capabilities, lack of supportive institutional infrastructure, and regulatory disincentives. DBL did not develop this innovation internally; rather, it acquired the technology externally and then internalized it under tight managerial oversight. This strategy choice reflects a dependent innovation strategy; wherein strategic moves are contingent on external triggers and executed through top-down mechanisms.

In contrast, Fibertex achieved a significant reduction in material weight from 25 GSM to 5 GSM through internal, incremental process innovation. This was not driven by external pressure or enabled through acquisition, but by long-term internal capability building, cross-functional collaboration, and an embedded organizational culture of experimentation. Fibertex's innovation was cultivated internally, making it a clear example of a craft-based responsive innovation strategy, where strategic differentiation is achieved through iterative, low-risk enhancements rooted in the firm's own knowledge base.

The divergence in outcomes is directly tied to the firms' capability configurations and institutional scaffolding. Fibertex possesses coordinating, learning, and reconfiguring capabilities structured to support internal R&D. These capabilities are reinforced by Denmark's supportive institutional environment—characterized by EU policy alignment, regulatory clarity, and a cultural embrace of

sustainability—which lowers the perceived risk of internal innovation and enables proactive strategic development.

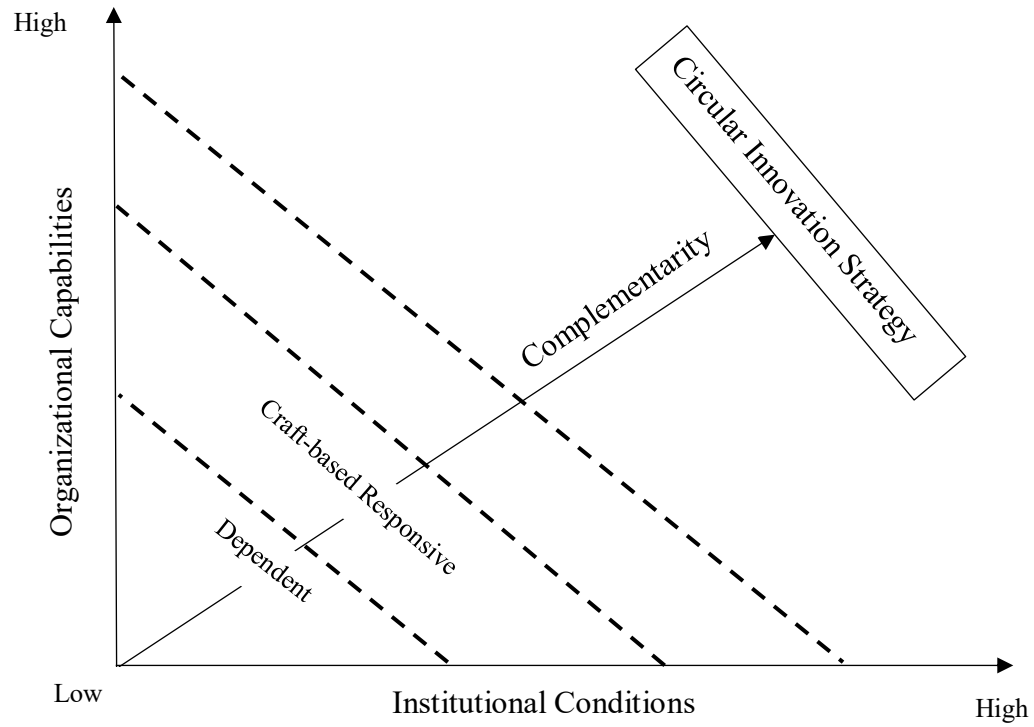
DBL, by contrast, operates in an institutional context marked by bureaucratic inefficiency, regulatory uncertainty, and lack of incentive alignment. Green investments are taxed like conventional ones, and procedural complexity discourages firms from engaging in circularity transitions without guaranteed returns. In this environment, innovation becomes risk-laden and must be justified through performance, not exploration. As a result, DBL's innovation efforts are externally prompted, internally constrained, and shaped more by compliance than capability.

This comparison illustrates that innovation strategy is not only a matter of organizational choice, but a response to the enablers and constraints of both internal capabilities and the organizational institutional conditions embedded within.

5 Discussion

Through the analysis and findings section, I described how differences in the organizational institutional structures, from which the firm's organizational capabilities are drawn, affect the firm's strategy for CTIs. **Figure 6** summarizes the discussion in a simplified manner. On the X-axis, I present the degree of Institutional Conditions for CTIs, ranging from high to low, while on the Y-axis I present Organizational Capabilities, likewise ranging from high to low in terms of structuring. In the middle, I present a direction towards a specific type of innovation strategy. The labels of dependent and craft-based responsive represent the distinct institutionally influenced innovation strategies that Whitley (2000, 2010) had described. Here, the lower the institutional conditions and organizational capabilities are, the more constrained the firm's choices become in regard to which innovation strategy it can pursue, and vice versa for firms situated in higher institutional conditions with higher organizational capabilities.

Figure 6: Firm's CTI across variable organizational capabilities and institutional complementarity



Source: Developed by author with elements from Whitley (2000, 2010)

Figure 8 illustrates how a firm's ability to engage in CTI depends on the interaction between its organizational capabilities and the institutional conditions of its environment. The x-axis represents the quality and coherence of institutional support—ranging from low to high—while the y-axis represents the firm's internal organizational capabilities, such as learning, coordination, and reconfiguration.

The dashed lines in the diagram denote thresholds that correspond to different innovation strategies:

- Dependent strategies are found where organizational institutional structures are low and unsupportive, and organizational capabilities are configured in a low, fragmented way. Firms in this zone typically respond reactively to external mandates and lack the internal capacity to drive innovation.

- Craft-based responsive strategies emerge in firms with slightly stronger capabilities or somewhat better institutional conditions. These firms tend to engage in incremental innovation driven by skilled labor and market feedback.

The diagonal progression from the bottom-left to the top-right represents what this thesis conceptualizes as institutional complementarity, the alignment between institutional context and organizational capability. As firms advance along this trajectory, they become increasingly equipped to adopt more complex and transformative circular innovation strategies.

The upward-pointing arrow labeled Circular Innovation Strategy reflects this progression. It signals that firms situated in environments with both supportive institutions and strong internal capabilities are better positioned to pursue high-ambition, system-oriented innovations.

5.1 Comparative Circular Innovation Strategies

My figure visualizes the central claim of this thesis: that successful CTI adoption is not solely a function of firm-level intent or technical capacity but rather emerges from the complementarity between organizational institutional structures and organizational capabilities. These capabilities are not fixed; they can be progressively upgraded over time. Buyer firms, as key actors in the global supply chain, can play a critical role in this process by identifying institutional bottlenecks within supplier firms and supporting the development of their organizational capabilities. Using the framework I have presented in **Figure 6**, buyers can more effectively align with suppliers to address specific barriers to circular transition and foster strategic capability upgrading.

While Whitley's innovation strategy typology explains how institutional structures shape both capabilities and circular innovation strategies, it does not account for how firms may evolve their strategic position through buyer-enabled capability development. My framework extends Whitley's model by introducing inter-firm support as a dynamic mechanism for strategic transformation. Specifically, my thesis contributes two central extensions to his framework:

First, by introducing the concept of institutional complementarity as an explicit mediating force, I demonstrate that it is not only internal firm structures (authority sharing and organizational careers) that influence the development of capabilities, but also the degree of alignment between those internal structures and the broader institutional environment. In Whitley (2000, 2003, 2010)'s original model, the development of capabilities was understood largely as an internal process

driven by institutional context, and so firms that remained within fragmented institutional contexts may be unable to evolve and adopt other strategies. My findings show that this process is often constrained by mismatches between firm-level goals (e.g., transitioning to circularity) and institutional mechanisms (e.g., tax incentives, financing procedures, regulatory coherence). This results in a certain capability friction, where a firm may have internal leadership will but lacks the institutional scaffolding to activate it. Through this discussion, I present my first proposition that is meant to answer my first research question.

RQ1. *How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations in the textile industry?*

Proposition 1: Firms with high complementarity between their organizational institutional structures and their organizational capabilities are more likely to internally develop CTIs. In contrast, firms facing capability friction—due to fragmented institutional support or rigid organizational hierarchies—are more likely to acquire external innovations through buyer-driven strategies.

Second, my analysis introduces the idea of capability upgrading through buyer-supplier alignment as a strategic response to institutional constraint. This idea is also echoed by Rana & Allen (2025). Whitley's model describes innovation strategies as relatively fixed outcomes of firm type and institutional environment. However, the cases presented in this thesis show that suppliers may progressively upgrade their innovation strategy by leveraging external capability reinforcement, especially through buyer partnerships. This is particularly evident in DBL's relationship with Puma, where technical support and long-term collaboration have enabled the firm to cautiously expand its learning and coordination capabilities, even in the absence of formal institutional support. This implies that while Whitley's model remains useful for explaining initial strategic positioning, it does not account for cross-border dynamics where firms evolve from dependent to more responsive or even internally innovative strategies over time. In light of this, I present my second proposition, which is intended to answer my second research question.

RQ2. *How do institutional structures influence circularity innovation strategies within textile ecosystems?*

Proposition 2: Institutional structures influence firms' circular innovation strategies indirectly by shaping the development and configurability of organizational capabilities. Where institutional environments enable distributed authority, stable career trajectories, and ecosystemic complementarity, firms are more likely to adopt proactive, craft-based innovation strategies. In contrast, fragmented or misaligned institutional environments push firms toward dependent strategies that rely on external triggers and actor-led support.

Thus, my extension of Whitley's framework introduces a dynamic perspective, where circular innovation strategies are not only a function of static institutional fit, but also of strategic inter-firm relationships that act as capability bridges across institutional asymmetries. This extension is critical for the Global South context, where suppliers embedded in fragmented institutional environments may rely on buyer alignment to incrementally construct the capabilities necessary for more ambitious innovation pathways. In this way, I reconceptualize Whitley's typology not as a deterministic classification system, but as a contingent, evolvable framework, where capability upgrading is made possible through cross-ecosystem cooperation.

6. Conclusion and Limitations

My thesis had set out to examine how organizational capabilities and institutional structures shape the CIS of supplier firms in the textile industry. It addressed two research questions: (1) How do organizational capabilities shape firms' ability to either develop (internally) or acquire (externally) circular technology innovations in the textile industry? and (2) How do institutional structures influence circularity innovation strategies within textile ecosystems?

Through a comparative case study of DBL Textiles in Bangladesh and Fibertex Personal Care in Denmark, my analysis demonstrated that CTI adoption is not solely a function of firm-level ambition or technical know-how. Rather, it emerges through the complementarity, or lack thereof, between a firm's organizational institutional structures and its capabilities for coordination, learning, and reconfiguration. These capabilities are shaped by organizational institutional structures such as authority sharing and organizational career systems but are also deeply affected by the degree of complementarity between CE transition goals and the firm's organizational capabilities. Where institutional complementarity is high, firms are able to internalize learning and

develop CTIs autonomously. Where such complementarity is low, firms face capability friction and rely more heavily on externally acquired innovations, often facilitated through buyer partnerships.

These findings led to two key theoretical contributions. First, this thesis extends Whitley's innovation strategy framework by introducing the concept of institutional complementarity as a mediating force between institutional environment and capability formation. This challenges the assumption that innovation strategy outcomes are predetermined by national institutional context and instead shows how firm-specific configurations of authority and career logic can either enable or inhibit innovation. Second, the thesis introduces the idea of buyer-enabled capability upgrading as a dynamic mechanism for strategic transformation. It proposes that suppliers embedded in fragmented or constraining institutional contexts may still evolve their innovation strategies through long-term partnerships that provide capability reinforcement, thereby reconceptualizing Whitley's typology as a contingent and evolvable framework rather than a static classification.

While the findings offer useful insights into the institutional and organizational enablers of circularity transition in textile ecosystems, this study has limitations. It is based on only two firms within a single industry and relies primarily on qualitative data drawn from semi-structured interviews. Future research could expand the scope by incorporating longitudinal or cross-sectoral studies, testing the propositions presented here in other contexts, or exploring how institutional complementarity and buyer alignment play out in more complex, multi-tiered supply networks.

Thus, my thesis contributes to a deeper understanding of how circular innovation strategies emerge, adapt, and evolve in response to institutional and organizational dynamics—particularly within the Global South. By highlighting the pathways through which capabilities can be constrained or upgraded, my thesis enables further targeted interventions by buyers, policymakers, and ecosystem actors seeking to further the transition toward sustainable and circular textile ecosystems.

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