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TRANSFORMATION TO CIRCULAR BUSINESS MODELS THROUGH SERVITIZATION. INSIGHTS FROM TEXTILE INDUSTRY

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Abstract. The textile industry is one of the most environmentally intensive sectors, making it a key target of circular economy policies in the European Union. Servitization can contribute to reducing its environmental impact by improving resource efficiency and fostering more sustainable business models, thereby supporting the implementation of circular economy principles. Addressing a significant gap in the literature, this study employs in-depth interviews with textile experts and industrial customers to develop a conceptual framework for the transition of the Bulgarian textile industry toward a circular business model through servitization.

Keywords: servitization; circular economy; textile industry; design phase
JEL: E23, M11, O32

Introduction

The transition to a circular economy is widely regarded by researchers, practitioners, and policymakers as a critical pathway for achieving the Sustainable Development Goals and mitigating further climate-related impacts. Virtually every economic sector involved in the production and consumption of goods and services generates waste containing natural or synthetic raw materials. In the EU-27, total textile waste generation reached 16 kilograms per person in 2022 and has remained relatively stable since 2016. The environmental impacts of the textile industry are particularly significant. In the European Union, the average person consumes approximately 19 kg of textiles annually, including clothing (7.95 kg), footwear (4.41 kg), and household textiles (6.58 kg). This corresponds to around 8.5 million tonnes of total textile consumption across the EU. Textile consumption increased from 17 kg per person in 2017 to 19 kg in 2022 (EEA, 2025a). Consequently, the textile sector has been identified as one of the priority areas within the European Union's circular economy agenda. However, the implementation of circular econ-

omy principles must take into account the specific characteristics of textile production processes and products.

The textile industry is one of the world's oldest economic sectors and makes a significant contribution to GDP, exports, and employment in both the European Union and the global economy. The sector encompasses the design, production, and distribution of yarns, fabrics, garments, blankets, carpets, and other textile products. Textiles extend beyond fashion, clothing, home furnishings, and footwear, playing a vital role in sectors such as healthcare, construction, and defence. Furthermore, the industry has an important role in supporting the implementation of circular economy principles, which are at the core of EU environmental policy.

In its 2030 Strategy for Sustainable and Circular Textiles, the European Commission sets out an ambitious vision whereby all textile products placed on the EU market are durable, repairable, recyclable, and largely manufactured from recycled fibres. These products should be free from hazardous substances and produced in a manner that respects both social rights and environmental standards. The strategy also aims to make fast fashion obsolete, enabling consumers to benefit longer from high-quality and affordable textile products. In addition, profitable reuse and repair services should become widely available, while the textile sector should remain competitive, sustainable, and innovative. Manufacturers are expected to assume responsibility for their products throughout the entire value chain, supported by sufficient recycling capacity and minimal reliance on incineration and landfilling.

Several actions designed to achieve these objectives are already underway. However, despite the transposition of relevant EU measures into national legislation, Bulgaria's progress towards the circular economy remains relatively slow. The country continues to lag behind in waste management and resource efficiency (EEA, 2025b). This modest pace of transition highlights the need for stronger policy support, mechanisms, and implementation approaches at both the European and national levels. The Ellen MacArthur Foundation defines the circular economy as a system in which materials never become waste and nature is regenerated. Within such a system, products and materials remain in circulation through activities such as maintenance, reuse, refurbishment, remanufacturing, recycling, and composting.

Servitization has been defined as "a process of building revenue streams for manufacturers from services" (Baines et al., 2017). Using internationally comparable data from the supply sheets underlying the World Input-Output Database (WIOD), Friesenbichler and Kügler (2022) measured servitization as the share of value added generated by services provided by the manufacturing sector across 37 countries and manufacturing industries between 2000 and 2014. Their findings indicate that servitization is generally more prevalent in developed economies and is influenced by national growth patterns. While the provision of high-technology services has increased, more than half of all services offered by manufacturing firms remain non-knowledge-intensive. For example, knowledge-intensive finan-

cial services have been found to play only a minor role in the service portfolios of manufacturing industries. Achieving the 2030 Sustainable Development Goals presents significant challenges for the manufacturing sector, including the adoption of circular economy principles and green servitization practices (Johl et al., 2024).

The relevance of this topic motivates the present study, which aims to explore whether servitization-based business models can encourage and facilitate the transition towards a circular economy. The scope of the study is limited to the textile industry.

Methodological Approach

This study investigates the role of servitization in advancing circularity, with a particular focus on its application within the textile industry. The research adopts a qualitative, dual-method approach that combines a systematic literature review with semi-structured interviews. The interview participants include individuals in managerial positions, such as chief executive officers, a quality systems manager from a textile manufacturing company, the CEO of a design studio, and the CEO of a leather clothing company. In addition, two leading researchers in the field of textiles were interviewed to provide expert insights and strengthen the analytical perspective of the study.

The literature review synthesizes both academic and practitioner sources, including empirical evidence, research findings, and industrial case examples, across three core domains: 1.Key aspects of the circular economy relevant to the textile ecosystem; 2.The nature and manifestations of production servitization strategies; and 3. The synergies between circular economy models and servitization, with a view to identifying opportunities for mutual reinforcement.

The study addresses the following research questions:

RQ1. Which outcomes of production servitization strategies can contribute to the adoption of sustainable practices in manufacturing firms?

RQ2. Can the implementation of servitization strategies during the textile design phase facilitate the adoption of circular economy principles?

The research is limited to the textile industry, with a specific focus on Bulgaria.

Theoretical and Practical Dimensions of the Circular Economy and Servitization

The Textile Ecosystem in a Circular Economy

The textile ecosystem encompasses the processing of natural fibres (cotton, wool, silk, and linen) as well as chemical fibres (synthetic and artificial) into yarns and fabrics. It includes the production of home textiles, clothing, carpets, technical textiles for automotive applications, industrial filters, footwear, and leather products. The ecosystem also covers textiles for medical purposes, protective clothing, agro-textiles, fashion products, and intermediate goods (European Commission,

2021). The production of these diverse products involves a highly heterogeneous network of suppliers, manufacturers, and technologies. A wide range of design, production, logistics, and distribution models are employed to create value, often within highly labour-intensive processes. As a result, the textile sector operates within a business environment that is particularly sensitive to environmental, social, and economic impacts. It is widely acknowledged that the prevailing linear production model commonly described as "take, make, dispose" contributes significantly to the environmental pressures associated with the textile industry.

Bulgaria adopted a Circular Economy Transition Strategy for the period 2022–2027[1]. However, the strategy does not include a dedicated policy framework for the textile industry. Financial incentives are available to support small and medium-sized enterprises (SMEs) in introducing resource-efficient technologies within the processing industry. These incentives include support for more efficient water use, with the textile sector identified as a priority area. Investment costs and expenditures related to the promotion of environmentally sustainable products and services are also eligible for financial support. In addition, waste recovery organizations operating under the principle of extended producer responsibility continue to play a leading role in the management of textile waste. The Bulgarian Circular Textile Association argues that separate collection and reuse make it possible to "close the loop" at the local level by extending the life cycle of existing textile products and avoiding a significant share of the environmental impacts associated with new production. As already-produced textiles are reused, the demand for virgin materials and additional manufacturing processes is reduced.

Efforts to mitigate the environmental impacts of the textile industry have primarily focused on the production phase. This emphasis is well justified, as approximately 80% of the climate impact associated with textiles occurs during production and across its various stages (Moazzem et al., 2022), making it a critical area for intervention.

Circular product design is also considered to offer significant economic benefits. It creates opportunities for innovative business models, such as take-back schemes, leasing arrangements, and product-as-a-service solutions. These models can generate additional value while reducing costs associated with production, waste disposal, and raw material extraction (Ellen MacArthur Foundation 2013). Furthermore, research indicates that consumer behaviour is changing, with increasing numbers of customers recognizing the need to reduce environmental impacts. Consumers are becoming more inclined to purchase products made from recycled materials and to avoid single-use items, seeking products that align with their environmental values. In response to these trends, many companies have adopted circular design policies for their products. One example is Lindström, which has integrated circularity principles into its business model and product development processes.

There is no universal approach to circular design, nor is there a single model that can be applied across all products, even within the same product category. Products manufactured by different companies or designed for different purposes often require distinct circularity strategies. Moreover, not all products can be effectively repaired, refurbished, recycled, or reused. Consequently, different circular economy principles must be combined to achieve an optimal balance among these objectives. The ultimate aim is to create products and services that can serve as resources for new production cycles. In this way, businesses can extend product lifecycles, meet evolving customer expectations, and enhance their corporate reputation.

Despite growing interest in applying circular economy principles within the textile ecosystem, government support has largely focused on improving production processes through the adoption of cleaner technologies and environmentally friendly raw materials. Although policy initiatives increasingly target the textile sector, their primary emphasis remains on waste management rather than waste prevention.

Important insights into the implementation of circular economy principles are provided by Friesenbichler and Kügler (2022). Drawing on numerous case studies of Cradle-to-Cradle-certified textile companies in Europe, the authors identify a range of factors across the textile value chain from product design to take-back systems and material recovery that can either accelerate or hinder the development of circular products. Of particular importance is their dynamic perspective on how collaborative innovation between suppliers and buyers shaped by factors such as supply chain position, bargaining power, and shared strategic vision interacts with product design characteristics, including material selection, product architecture, and functionality. Together, these factors influence the speed of circular product development as well as the volume of products that are sold, returned, and ultimately regenerated.

Digitalization has become widespread across service sectors, attracting significant scholarly attention. Shah et al. (2025) argue that the integration of platform-based approaches to support the implementation of circular economy principles remains insufficiently explored. Their findings suggest that technologies such as the metaverse, digital networking, and environmental disclosure platforms can have a significant positive effect on advancing circular economy practices. However, other studies indicate that excessive digitalization may hinder this transition, suggesting that the relationship between digitalization and the circular economy is non-linear (Nham & Ha, 2022).

As businesses seek new models to address climate change and facilitate the transition from a linear to a circular economy, servitization is increasingly recognized as a key strategic approach. Nevertheless, its role in supporting regenerative business practices remains insufficiently understood. Recent research argues that regeneration should be delivered either as a service or through product-centric business

logic, while also considering the associated economic, environmental, and social impacts (Spadafora & Rapaccini, 2025).

Achieving Circularity through a Production Servitization Strategy

The service component is becoming increasingly important in business models within the textile industry, particularly in the clothing and fashion sectors, where services such as maintenance, repair, and logistics are increasingly integrated with manufactured products. Although opportunities exist to adopt innovative solutions, the high initial investment required for new technologies, including energy-efficient technologies, often represents a significant risk for companies. Production servitization offers a potential way to overcome these and other barriers.

Servitization creates value by transforming traditional product-oriented manufacturing into a business model that combines products and services. Rather than selling a product outright, companies sell the functionality or performance that the product provides. This approach can generate lasting competitive advantages, strengthen customer relationships, increase customer loyalty, and enhance the service component of product offerings. Moreover, servitized business models are likely to perform better from an environmental perspective, although not necessarily from an economic one (Kanatlı & Karaer, 2022).

The concept of servitization was first defined by Vandermerwe and Rada (1988) as a process through which manufacturing firms enhance their products by offering associated services. Traditionally, three types of product-service systems (PSS) have been distinguished: product-oriented, use-oriented, and result-oriented systems. Later, Neely (2008) identified twelve distinct servitization approaches in developed economies and introduced two additional categories: integration-oriented and service-oriented product-service systems. Research suggests that servitization tends to generate more benefits for smaller firms, whereas larger organizations often face greater implementation challenges and hidden risks.

Kanatlı and Karaer (2022) conclude that the environmental superiority of servitization depends on three main factors: (1) product-related costs, including production, maintenance, and operating costs; (2) customer heterogeneity; and (3) market composition. From an environmental perspective, servitization is particularly suitable for high-cost products. The authors define servitization as a promise of future accessibility to a product's functionality rather than ownership of the product itself.

Drawing on several case studies of multinational manufacturing firms operating in B2B markets, Spadafora and Rapaccini (2025) demonstrate that embedding regeneration into extended service offerings through Regeneration-as-a-Service (RaaS) strengthens long-term customer relationships. Their findings confirm that servitization is a key strategy for addressing regeneration challenges, although this area remains underexplored. The authors argue that the RaaS model is particularly effective in promoting long-term cooperation and sustainability among highly

servitized firms with comprehensive service offerings. Furthermore, they conclude that the Regeneration-as-a-Product (RaaP) model can facilitate market expansion and waste reduction, although each model requires specific production, logistical, and organizational conditions.

A growing number of companies worldwide successfully combine circular economy principles with servitized business models, achieving both sustainability and profitability, including firms within the textile industry. However, research on servitization in the textile sector remains limited and is largely focused on clothing and fashion applications.

One of the most widely cited examples is the carpet manufacturer Desso, which transformed its business model by adopting a circular servitization strategy and introducing the Product-as-a-Service (PaaS) concept for carpet management. Rather than selling carpets, the company offers them as a service. Customers pay a monthly fee for access to the product, while Desso retains ownership and responsibility for maintenance, refurbishment, and end-of-life management. By collecting used carpets and recycling them into new products, the company has established a closed-loop system that minimizes waste and enables materials to be continuously reintroduced into the market. Through systematic innovation and the implementation of a subscription-based model (Nansubuga & Kowalkowski, 2024), Desso has achieved significant reductions in environmental impact. Its customer base includes households, office buildings, and event organizers. This model aligns incentives for the production of durable, long-lasting products (Desso, 2013). As part of the Tarkett Group, the company continues to advance its circularity strategy.

Through servitization, companies can create offerings that are difficult for competitors to replicate, similar to the logic of the Blue Ocean Strategy (Kim & Mauborgne, 2005). Such offerings can generate sustained competitive advantages and higher profitability over longer periods. Furthermore, revenues derived from services often yield higher profit margins than revenues generated through product sales alone. This constitutes a strong incentive for manufacturing firms to explore and implement servitization strategies.

Using the lens of situational factors theory, Sironi et al. (2021) provide one of the first attempts to map the drivers and barriers of digital servitization in the textile industry. They classify these factors into six main categories: technology, organization, customers, competition, cooperation, and governments and other institutions. Although developed in a different industrial context, the conceptual model proposed by Han et al. (2020) is also applicable to the textile and clothing industry. Their research demonstrates that servitization can maximize product life cycles within a circular economy framework by extending product longevity. Furthermore, in line with circular economy principles, the product life cycle should not be viewed as a linear sequence from design and production to consumption and disposal. Instead, it should be understood as a network of interconnected

pathways involving repair, refurbishment, remanufacturing, and upgrading. The proposed business model enables products to be repaired, renovated, and modernized throughout their useful life. From a circular economy perspective, the authors emphasize that smart connected products enabled by the Internet of Things (IoT) play a critical role in facilitating multiple transitions toward service-oriented circular business models.

Integrating Services through the Eyes of Stakeholders

Manufacturing companies that have not yet embarked on the path of servitization often find it difficult to envision how a product-service integration business model could contribute to business growth. This perception strongly confirms findings from previous studies. All interviewed participants, including representatives of manufacturing companies, tailoring firms, and academia, agreed that servitization models are difficult to implement and may not necessarily lead to immediate improvements in productivity. When developing a servitization strategy within the textile ecosystem, it is essential to consider the specific characteristics of different textile products and their respective life-cycle stages. The strategy must also be tailored to the stakeholders involved in the implementation and delivery of services, as these stakeholders form the critical link between the company and the end user. This consideration applies equally to industrial and consumer markets.

The main research question focused on identifying the life-cycle stage at which servitization should be implemented in order to facilitate decision-making and support the application of circular economy principles. All survey participants supported the view that the servitization of the textile ecosystem requires a fundamental restructuring of organizational resources, processes, employee skills, and capabilities. Respondents unanimously agreed that such transformation would increase operational costs. Representatives of manufacturing enterprises were particularly skeptical, expressing the view that servitization would not necessarily generate corresponding increases in revenue. According to the respondents, low-technology textile production segments, such as yarn and fabric manufacturing, are likely to face greater challenges in adopting pure servitization models, whereas clothing manufacturing and fashion-related activities offer more favorable conditions for implementation. In this regard, Sholihah et al. (2020) argues that inadequate strategic planning and poor implementation of servitization can result in a "*service paradox*," whereby significant investments in services fail to deliver the expected performance outcomes. This occurs because servitization requires profound organizational transformation and involves a complex implementation process whose outcomes are not always predictable.

In the context of the European Green Deal and the EU Strategy for Sustainable and Circular Textiles, it is important to focus not only on incorporating circular economy principles into textile production, design, use, recyclability, and waste

recovery, but also on promoting product designs that facilitate reuse, repair, and recyclability throughout the product life cycle. Integrating servitization during the product design phase involves moving beyond the development of a tangible product and toward the creation of a comprehensive Product-Service System (PSS). Instead of focusing exclusively on manufacturing specifications, the design process is reoriented toward delivering long-term customer value, including performance, affordability, durability, and repeatable benefits (Sgambaro et al., 2024).

The respondents strongly emphasized that efforts to apply servitization as a means of implementing circular economy principles in Bulgaria should focus on two key directions:

1. Integration during the product design and development phase by creating products that are recyclable, free from hazardous substances, or designed in a way that facilitates the removal and replacement of potentially harmful components.

2. Adoption of proven service-based business models, involving a shift from selling physical clothing products to providing them as a service. Product-service systems, such as those successfully implemented by the Swedish company Lindström, are already operating in Bulgaria. This approach facilitates the transition from a traditional linear economy model toward a circular business model.

According to the respondents, circularity cannot be achieved solely by closing material loops through the collection and transformation of waste into secondary raw materials. This argument reflects findings from previous studies, which report limited interest among manufacturers of yarns, fabrics, blankets, and carpets in adopting circular business practices beyond recycling activities (Morales, 2020; Daddi et al., 2019).

The discussions following the interviews focused extensively on the role of the design phase in supporting servitization. Participants emphasized that companies should no longer design standalone products but rather develop integrated solutions in the form of Product-Service Systems. Subsequently, the service model should be refined to ensure that the proposed services meet customer needs while remaining aligned with the firm's capabilities and resources. The services incorporated into a servitization strategy should address the needs of multiple stakeholders, including customers, products, product use, and performance outcomes. Once all relevant stakeholders, including suppliers, distributors, and service partners – have been identified, firms can proceed to the prototyping stage. Although this process may be challenging and resource-intensive, respondents emphasized the importance of approaching it strategically and efficiently. The primary anticipated barriers include increased maintenance costs, higher energy consumption, and potential resistance from customers.

During the interviews, several Bulgarian companies applying elements of circular and servitized business models were identified and will be subject in future research. One example is Eurotex Ltd. through its TexCycle initiative, which has

evolved from a textile-sorting company into a provider of comprehensive circular solutions for the fashion industry. Its activities include the collection, sorting, distribution, repair, reuse, and recycling of clothing, footwear, and other textile products. Another notable example is Biancolinen Group Ltd., which operates as a business-to-business (B2B) service provider. Rather than merely selling textile products, the company offers integrated linen supply, maintenance, and rental services, primarily serving hotels and businesses within the hospitality and restaurant sectors. This model exemplifies how servitization can create value by shifting the focus from product ownership to service provision and long-term customer relationships.

Conclusion and Future Research

This study demonstrates that servitization has significant potential as a strategy for promoting and facilitating the implementation of circular economy principles in manufacturing enterprises. By integrating products and services into a single value proposition, servitization represents an effective business model capable of supporting both corporate objectives and broader policy goals related to the green transition, particularly those associated with the circular economy. Despite increasing policy attention to sustainability and circularity, research in Bulgaria remains limited, and practical efforts to implement circular economy principles within the textile industry are still relatively modest. The findings from interviews with textile industry managers and academic researchers suggest that servitization can be integrated not only during the design and production stages but also throughout the after-sales, use, and end-of-life phases of the product life cycle. Rather than merely selling clothing or textile products, manufacturers can provide value-added services such as maintenance, repair, leasing, collection, reuse, and recycling, thereby extending product lifespans and enhancing resource efficiency.

Achieving the transition to a circular economy requires not only supportive regulations, policy measures, and an enabling business environment but also substantial transformation within business organizations themselves. Such transformation must be strategically planned and implemented. To facilitate the adoption of circular economy principles, it is essential to identify and address the barriers associated with organizational restructuring, resource allocation, capability development, and business model innovation.

Future research should focus on examining these challenges in greater depth, particularly within large textile manufacturing enterprises as well as micro, small, and medium-sized enterprises operating in the clothing and fashion subsectors. Given the limited number of empirical studies conducted at the national level, further research is needed to explore the practical implementation of servitization strategies and their contribution to circular business model development in the Bulgarian textile industry.

Disclosure of Generative AI and AI-Assisted Technologies Usage

For the final version of this paper, the authors used GPT-based artificial intelligence tools to improve the readability, language quality, and clarity of the manuscript. Following the use of these tools, the authors carefully reviewed, revised, and edited the content as necessary and assume full responsibility for the accuracy, integrity, and content of the publication.

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NOTES

1. https://www.strategy.bg/bg/strategy-documents/838

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