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Research Article

Can Türkiye Be a Hub For Closed-Loop Systems in the Textile Industry for the EU?

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Abstract

The global textile industry, valued at \$414 billion, confronts substantial environmental challenges, contributing to waste, pollution, and greenhouse gases. This paper examines Türkiye's potential to drive sustainability in textiles, exploring circular systems that minimize waste and promote eco-friendly practices. The paper consists of seven parts. After introduction, in the second part the importance of sustainability and circularity in textile industry is explained. Third part examines the Türkiye as a major textile player, and the challenges of textile recycling industry. Overwhelming obstacles like insufficient recycling infrastructure require industry initiatives, government regulations, and technological innovations. Following parts explains the main limitations of the textile recycling in EU and questions if Türkiye, with its production capabilities and recycling expertise, could be a key ally for EU to solve the obstacles of current textile recycling challenges. Recommendation and Conclusion parts offer a road map for Türkiye to enhance its capabilities to become a key ally for EU, exemplifying a transformative shift towards a sustainable textile industry.

Keywords : Circular Economy, Closed-loop, Textile Recycling

JEL Classification : Q01, Q32, Q38

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Türkiye, Avrupa Birliği için Tekstil Endüstrisinde Kapalı Döngü Sistemleri için Bir Merkez Olabilir mi?

Öz

Küresel tekstil endüstrisi, 414 milyon dolarlık değeriyle, atık, kirlilik ve sera gazlarına katkıda bulunan önemli çevresel zorluklarla karşı karşıyadır. Bu çalışma, Türkiye'nin tekstil sektöründe sürdürülebilirliği sağlama potansiyelini inceleyerek, atıkları en aza indiren ve çevre dostu uygulamaları teşvik eden döngüsel sistemleri analiz etmektedir. Makale yedi bölümden oluşmaktadır. Girişten sonra, ikinci bölümde tekstil endüstrisinde sürdürülebilirlik ve döngüsellüğün önemi açıklanmaktadır. Üçüncü bölümde, Türkiye'nin önde gelen bir tekstil oyuncusu olarak yeri ve tekstil geri dönüşüm endüstrisinin zorlukları ele alınmaktadır. Yetersiz geri dönüşüm altyapısı gibi büyük engeller, sektör girişimleri, hükümet düzenlemeleri ve teknolojik yenilikler gerektirmektedir. Sonraki bölümler, AB'deki tekstil geri dönüşümünün temel sınırlamalarını açıklamakta ve Türkiye'nin üretim kapasitesi ve geri dönüşüm uzmanlığıyla AB için mevcut tekstil geri dönüşüm zorluklarının aşma yolunda kilit bir müttefik olup olamayacağını sorgulamaktadır. Öneri ve Sonuç bölümleri, Türkiye'nin tekstil geri dönüşüm yeteneklerini artırması için bir yol haritası sunmakta ve sürdürülebilir bir tekstil endüstrisine doğru dönüştürücü bir değişimi örneklemektedir.

Anahtar Kelimeler: Döngüsel Ekonomi, Kapalı-döngü, Tekstil Geri Dönüşümü

JEL Sınıflandırması: Q01, Q32, Q38

1. Introduction

The global textile industry, while recognized for its pivotal role in fashion and commerce, stands at the intersection of economic progress and environmental challenges. With its extensive supply chains and production processes, the textile industry is both a significant contributor to economic growth and a substantial burden on the environment. The worth of the global textile industry has reached to US\$414 million worldwide in 2019, and it contributes 7% to the total world exports (Fernandez-Stark et al, 2022). Labor-intensive apparel production employs millions of workers, particularly in some of the world's least-developed regions (ILO, 2021). The sector's environmental challenges vary from resource consumption to the generation of vast quantities of waste, pollution, and wastewater containing toxic chemicals (Mondal et al., 2016). Every year, the textile sector emits 2-8% of the world's greenhouse gases, uses the equivalent of 86 million Olympic-sized swimming pools of natural water resources, and is responsible for 9% of microplastic pollution in our oceans (UNEP 2023). In an era characterized by increasing ecological awareness, sustainability transformation is vital for the textile industry through circular economy solutions that address these environmental challenges.

Circularity in the textile industry refers to the concept of creating a closed-loop system where textiles are designed, produced, used, and recycled in a way that minimizes waste, conserves resources, and reduces the industry's overall environmental footprint. It involves practices to extend the lifespan of textile products and to provide a more sustainable and eco-conscious choice for consumers. The goal is to drop the traditional linear model of "take-make-dispose" and create a circular textile industry that optimizes resources, reduces pollution, and contributes to the principles of circular economy.

This paper is designed to explore Türkiye's potential role as a key player in fostering sustainable and circular practices within the global textile sector. The primary question is the assessment of Türkiye's suitability as a hub for closed-loop systems in the textile industry, examining the strengths and weaknesses of the textile industry in implementing global circularity solutions, analyzing existing initiatives and their impact, understanding challenges and opportunities, and evaluating the role of government policies. The objectives encompass providing a holistic view of Türkiye's prospects, identifying key industry attributes, highlighting sustainability initiatives, proposing strategies for addressing challenges, and gauging the influence of policy and industry infrastructure in Türkiye's journey toward circular textiles.

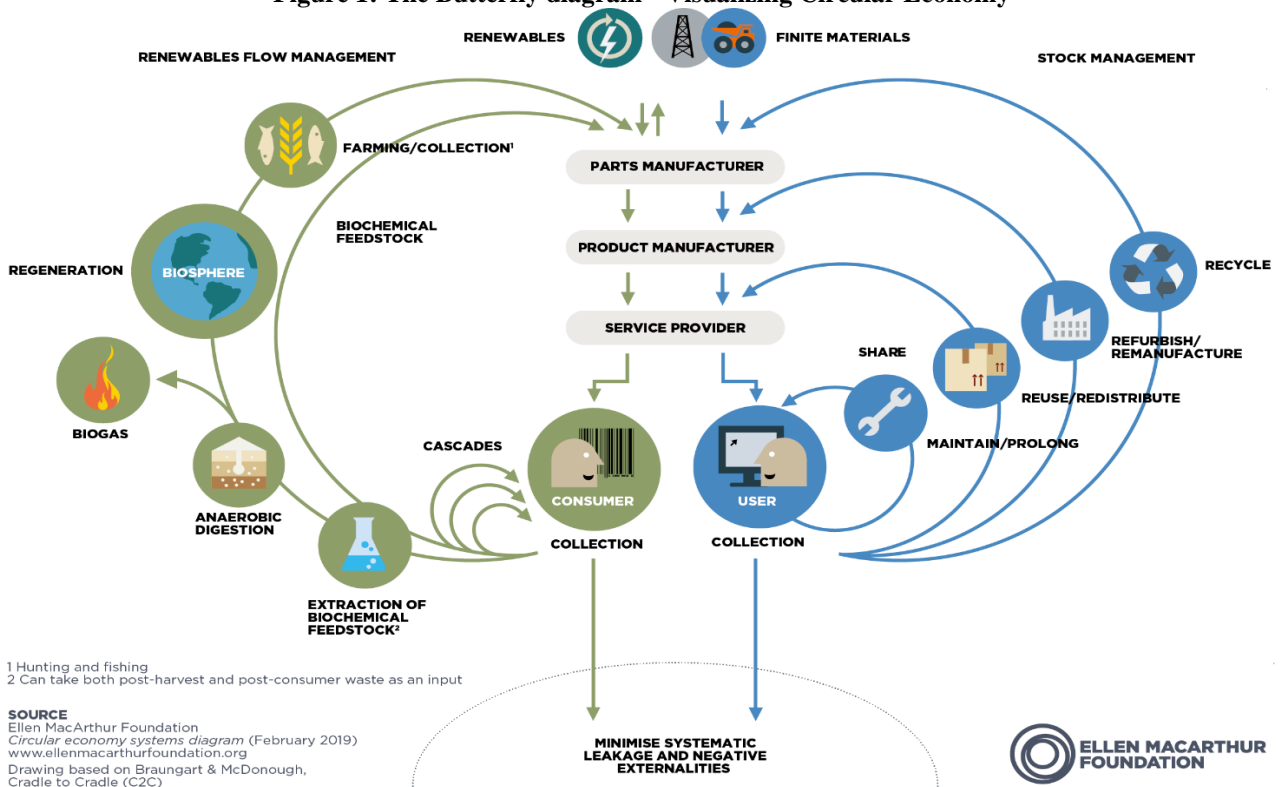
2. Sustainability: The Ultimate Goal for the Textile Industry

The environmental impacts of the textile industry are widespread and significant within its extended supply chain. This industry is well-known for its resource-intensive operations, including the massive consumption of water, energy, and chemicals. One of the most pressing concerns is water usage, with the dyeing and finishing processes demanding vast quantities of water and often resulting in wastewater pollution, accounting for around 20% of industrial water pollution by releasing significant amounts of toxic chemicals into the environment (Ellen MacArthur Foundation, 2017).

Moreover, the textile industry contributes to 8% of the world's greenhouse gas emissions (European Parliament, 2014), primarily through energy consumption and transportation, and is known to be one of the largest water consumers globally, using around 79 billion cubic meters of water annually (European Parliament, 2014). The extensive use of non-renewable resources, such as petroleum-based synthetic fibers, further exacerbates its environmental footprint. This impact is not only due to resource depletion but also contributes significantly to microplastic pollution, one of the main causes of biodiversity loss. Additionally, the industry generates 92 million tons of textile waste yearly, from discarded clothing to off-cuts and unsold inventory (Niinimamp et al., 2020). All these factors underscore the urgent need for a circular and closed-loop system in the textile industry to mitigate its environmental impact and strive for an eco-friendly future.

A closed-loop system in textiles is inspired by the principles of a circular economy, where products, materials, and resources are used efficiently and kept in use for as long as possible. It involves designing products for durability, using eco-friendly materials, and implementing resource-efficient manufacturing processes to keep textile products in circulation as long as possible. The core principles include reducing waste, reusing materials, and recycling textiles at the end of their life cycle. Ellen MacArthur's Butterfly Diagram provides a tremendous visual illustration to understand the principles of a circular economy better as Figure 1. It highlights the implication of closed-loop systems in minimizing waste, conserving resources, and creating a more sustainable economic model.

Figure 1: The Butterfly diagram - Visualizing Circular Economy



Source: Ellen MacArthur, 2019

The diagram is shaped like a butterfly, with two loops. The top loop represents the biological cycle (biological materials returning to the biosphere), while the bottom loop represents the technical cycle (industrial materials staying in a closed-loop system). In the bottom wing of the butterfly, which represents the technical cycle, the emphasis is on keeping materials and products in a closed loop by repairing, remanufacturing, and recycling instead of disposing of them immediately at the end of their life. The goal of the loops is to extend the life cycle of the products as long as possible to decrease their environmental footprint and prevent them from using new sources.

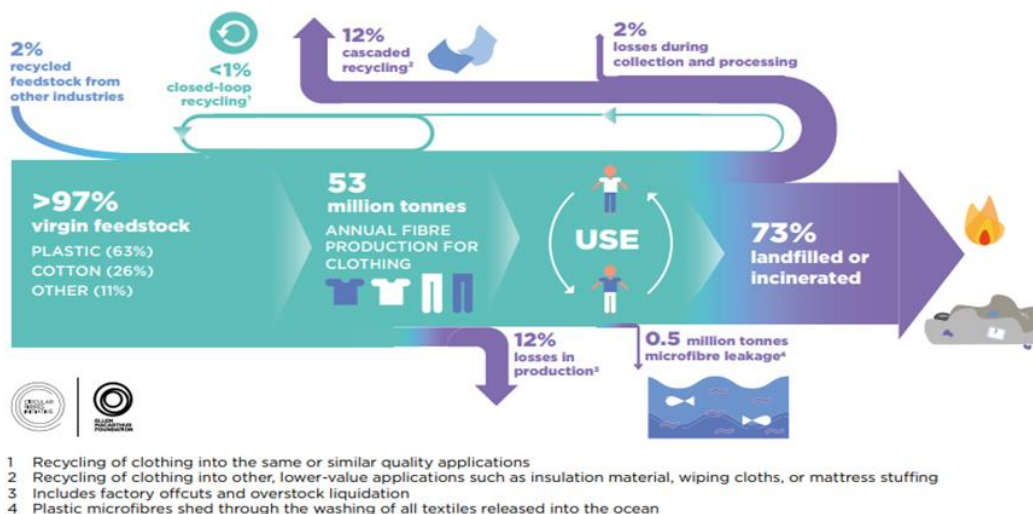
3. Textile in Türkiye: From A Global Perspective

Textile is a vital industry within Türkiye's economy. It stands as one of the largest textile producers and exporters globally, contributing significantly to Türkiye's industrial landscape as specified in the study by Duran and Dinç, 2016. The sector covers many products, including apparel, home, and technical textiles. The textile industry is crucial in Türkiye's employment, providing jobs for thousands of people, particularly in smaller cities and rural areas. (Duran and Dinç, 2016). Türkiye's strategic geographic location, well-established supply chains, and skilled workforce have further cemented its status as a textile hub, making it a key player in the global textile market.

Türkiye's total garment sector exports reached 19 million US dollars in 2023 having a substantial impact on international trade and commerce according to the data of the Turkish Exporters Assembly (TİM, 2024). The country has 59,000 companies in textile manufacturing, which are mostly small or medium-sized entities, and employ around 1 million (registered) people (T.C. Sanayi ve Teknoloji Bakanlığı, 2021). For the EU, Türkiye ranks as the second largest textile producer, (UNDP 2020) which makes Türkiye an important partner in the textile industry.

Besides, Türkiye's textile recycling industry played a crucial role in the country's sustainable development efforts in recent years. In particular, the City of Uşak stands out as a significant hub (Altun, 2106; Öner, 2023). Located in western Türkiye, Uşak has become a central spot for textile recycling due to its large number of recycled fiber and yarn manufacturers that process discarded textiles. 85% of Türkiye's textile waste is recycled in Uşak (Zafer Kalkınma Ajansı, 2019). Moreover, Uşak's expertise in textile production and its access to raw materials make it an ideal location for repurposing and upcycling textiles. As the textile industry in Türkiye continues to grow, Uşak's role as a recycling hub is gaining importance in promoting sustainability and reducing the sector's environmental footprint.

Figure 2: Global Material Flow for Clothing 2015



Source: Ellen MacArthur, 2017

The opportunity to achieve better waste management in the textile industry lies in recycling blended materials effectively, whether they originate from post-consumer or post-industrial sources. Mechanical recycling is widespread but has its constraints, and chemical recycling remains relatively underdeveloped. Globally, many recyclers identify elastane as a more significant obstacle than any other fiber due to its common use, adding another challenge to the complexity of the recycling process (Fashion for Good, Circle Economy, 2022; Wojciechowska, 2021).

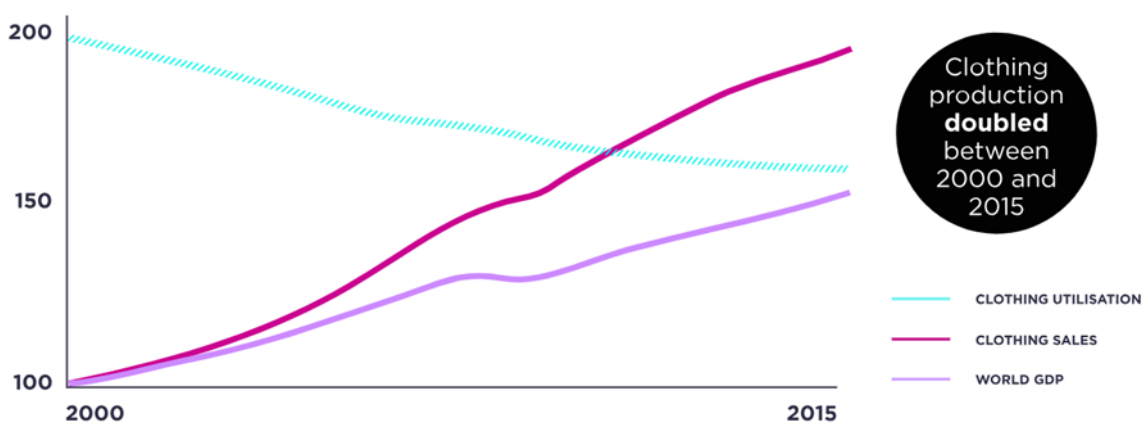
The global nature of the textile industry means that waste can be generated at various points in the supply chain, from production to distribution, complicating waste management efforts. The economics of textile recycling can also be challenging. The costs associated with collecting, transporting, sorting, and processing textiles must be balanced with the potential value of the recycled materials (Watson et al, 2014).

Addressing these challenges requires a combination of industry-wide initiatives, government regulations, consumer education, and the development of innovative recycling technologies to make the textile industry more sustainable and reduce its environmental footprint. The contribution of SMEs in this process cannot be underestimated. As Yorulmaz (2023) highlights in its study, particularly in SMEs, the environmental awareness and innovation of top management are the most influential factors in adopting green strategies. Additionally, creating a green image has been shown to positively impact stakeholder and customer perceptions, contributing to profitability. Furthermore, the study points out that cost efficiency is a weaker motivator for green strategies, likely due to SMEs' limited resources and the high initial investment costs associated with sustainable technologies.

4. Is It Possible to Close the Loop in EU for Textile Products?

Apparel represents just one aspect of the textile industry. The notable global increase in apparel production and consumption over the last 15 years, resulting in a significant rise in waste generation, is one of the many reasons the textile industry is the second polluting among others (See Figure 3). It is no surprise that the EU Strategy for Sustainable and Circular Textiles describes the 2030 vision for the European textiles market as such: “By 2030, textiles on the EU market should be durable and recyclable, largely made of recycled fibres, free of hazardous substances and produced in an environmentally friendly way while respecting social rights. Fast fashion should be ‘out of fashion’ and re-use and repair services would be widely available. Textiles should be collected at the end of their lifetime and their incineration and landfilling reduced to a minimum thanks to innovative fibre-to-fibre recycling” (European Parliament, 2024)

Figure 3: Growth of clothing sales and decline in clothing utilization since 2000



Source: Ellen MacArthur, 2021

Gross textile waste in EU-27 and Europe is expected to grow from 7.0 million to 7.5 million tons in 2022 to 8.5–9.0 million tons in 2030 (Janmark et al, 2022). The separate collection of textile waste

grew from approximately 2 million tons in 2014 to 2.8 million tons in 2019 in Europe. This figure is expected to increase significantly once the EU waste legislation is implemented by the end of 2024 (Euratex, 2020).

European textile companies have been investing for circular solutions to accelerate the shift to circularity. However, most of the recycling methods and circular solutions currently available, whether in the market or in the research and development stage, only make up a tiny part of the overall textile market. Developing high-quality pre-processing at the right cost and scale remains a bottleneck for the sorting and recycling industry to overcome worldwide (Gözet et al, 2021). Even though there is improvement on the sorting phase and there will be enough feedstock to supply the recycling industry, the current yarn-spinning capacity presently is at 1.5 million tons per year in the EU region which is anticipated to challenge the goal of closing the loop fiber to fiber. There is limited capacity in Europe to manage all textile waste streams. According to recent reports, scaling the European textile recycling value chain will likely require a €6 billion to €7 billion investment (Janmark et al, 2022).

Furthermore, the textile industry has established itself in underdeveloped countries in the last decades due to several key factors. First and the most important reason is the fact that labor costs are considerably lower in these regions, making textile production cost-effective for manufacturers. Besides, the availability of raw materials and a large labor force are also crucial, and many underdeveloped countries offer abundant resources and a surplus of skilled and unskilled labor. The relocation of textile industries to these regions has created a competitive advantage for many European brands.

The local production of recycled fibers could play a key role in strengthening the European textile value chain. However, strong barriers are challenging to address individually, and broad collaboration appears to be needed across value chains (Köhler et al, 2021).

5. Türkiye: Future Hub for Closing the Loop

The Turkish textile and clothing industry covers the entire textile value chain and, therefore, a wide range of activities from the processing of natural or synthetic fibers into yarns, the production of woven, knitted, or non-woven fabrics, the treatment of textile materials (finishing, dyeing, coating) up to the production of a great variety of end-products such as high-performance technical textiles for a lot of industrial applications as well as home textiles and apparel. The capability to serve the various stakeholders of the supply chain with high expertise and the nearshoring advantage makes Türkiye a significant partner in circularity for the EU market (Halife, 2020).

Türkiye has developed noteworthy expertise, especially in mechanical textile recycling, positioning itself as a leader in this field. The country's textile recycling industry utilizes advanced machinery and processes to break down and repurpose used textiles efficiently. With a focus on sustainability, Turkish companies have honed their skills in extracting valuable materials from discarded textiles, reducing waste, and conserving resources.

With a yarn-spinning capacity exceeding 7 million tons and a vertically integrated production structure spanning from fiber to fabrics and garments on a regional or country basis, crucial for circular textile infrastructure, Türkiye has emerged as a near-shoring recycling solution for European clothing brands and retailers (Janmark et al, 2022). It could potentially become a critical ally in supplying closed-loop material flows for the EU during its transition to circular textiles.

As per the new EU regulation on waste shipment which was adopted on 11 April 2024 (Regulation (EU) 2024/1157 of the European Parliament and of the Council of 11 April 2024 on shipments of waste), legal restrictions will be imposed on the direct export of textile waste from the EU to non-OECD nations. Furthermore, the shift from used clothing donations to waste disposal is likely to result in a smaller portion of collected items being suitable for resale. (Under the recent regulation on

the shipment of waste, the export of textile waste to non-OECD countries would be allowed only under the condition that such countries notify the Commission of their willingness to import specific types of waste and demonstrate their ability to manage it sustainably.) Establishing Türkiye as a key partner in this endeavor would also mitigate the risks associated with the inability to process textile waste that will be prohibited from trading with underdeveloped countries.

6. Recommendations: Action Plan for Türkiye's Textile Industry

Türkiye stands as a primary candidate to become a central ally in the European Union's closed-loop textile transition. With its well-established textile sector, Türkiye can play a pivotal role in supporting the EU's circularity goals by sharing expertise, technology, and best practices. Collaborative efforts between the EU and Türkiye can further advance the transmission of a circular economy, promoting responsible resource management, reduced waste, and enhanced environmental sustainability. This strategic partnership holds great potential for the mutual benefit of both regions and should be actively pursued.

Besides its advantages, Türkiye also has some improvement areas to consider within the developing recycling industry. Our recommendations are as follows.

- **Increasing the quality of collection and sorting facilities:** Establishing a well-designed textile sorting system in Türkiye to optimize waste for the recycling industry stands as a critical step towards aligning with the EU's Green Deal requirements. By enhancing these facilities to meet higher standards, Türkiye can significantly bolster its recycling infrastructure, aligning it more closely with the sustainability goals outlined by the EU. This improvement not only advances Türkiye's environmental objectives but also strengthens its potential to achieve a balanced collaboration with the EU, facilitating smoother integration into the broader European recycling framework. Upgrading these facilities is fundamental for elevating the nation's environmental stewardship and meeting the precise criteria set forth by the EU's Green Deal, fostering a more sustainable and harmonized closed-loop ecosystem.
- **Change of VAT regulations for discarded textiles:** Revising VAT regulations concerning discarded textiles in Türkiye can significantly contribute to positioning the nation as a closer partner for the EU in building a circular economy. Currently, a significant part of textile waste is still taxed according to VAT regulations. Adjusting VAT policies to encourage recycling initiatives and reutilization of discarded textiles would foster a more sustainable approach to managing these materials. Such changes not only stimulate the proper distribution of textile waste but also align Türkiye's regulations more closely with the circular economy objectives of the EU. This adaptation would enhance Türkiye's role as a partner in the EU's efforts to establish a closed-loop system, promoting resource efficiency and minimizing the environmental impact of textile waste. This alignment signifies Türkiye's commitment to shared sustainability goals, paving the way for a more robust partnership with the EU in realizing a circular economy within the textile industry.
- **Improving the textile waste import procedures to feed raw materials for the recycled yarn manufacturers:** Enabling Türkiye to import textile waste from the EU and establishing close-loop agreements to take back textile waste hold substantial importance in supporting the nation's recycled yarn manufacturers with a consistent supply of raw materials. Improving the procedures for textile waste imports is crucial for advancing the circular economy in Türkiye's textile industry and for supporting EU through its closed-loop targets in the textile industry. This stream of raw materials is fundamental for local manufacturers, serving as a sustainable resource that significantly reduces the reliance on virgin materials. By facilitating the controlled and regulated import of textile waste from the EU, Türkiye not only fosters the growth of its recycled yarn sector but also aligns with the circular economy goals outlined by

the EU. This collaboration promotes resource efficiency, merges textile waste into new products in a cradle-to-cradle approach, and aids in minimizing the environmental impact of textile production, establishing Türkiye as a key player in the closed-loop textile manufacturing landscape.

- **Waste trade system linking EU countries and Türkiye:** One of the key challenges clogging closed-loop systems in the textile industry is the absence of a comprehensive digital solution bridging companies in need of waste as feedstock with those possessing waste to offer (Ministry of Foreign Affairs, 2021). Developing a digital platform that efficiently connects these entities is pivotal in creating a more circular and sustainable textile ecosystem. This platform could serve as a marketplace or network, streamlining the exchange of information, facilitating transactions, and fostering partnerships between waste-producing and waste-consuming companies. By implementing such a digital solution, the industry can optimize resource utilization, minimize waste, and enable a more seamless transition towards a closed-loop system, fostering a more sustainable and interconnected textile industry.

7. Conclusion

In the global textile industry, it's clear that we need to make changes for sustainability. Türkiye holds a significant opportunity to establish itself as a central player in the circular textile movement, offering economic advantages while addressing environmental concerns. While the industry brings economic benefits, its environmental impact is substantial. Shifting to a circular approach in textile production can bring transformative changes. It involves smarter material usage and the development of a digital system connecting companies with surplus materials to those in need. Türkiye, with a strategic assessment of its capabilities and ongoing initiatives, has the potential to lead this transformative change. By doing so, it can not only enhance its textile industry but also serve as a guiding example for the world, particularly for the EU, in the quest for a more eco-friendly and sustainable textile future.

CONTRIBUTION OF AUTHORS

This study was entirely conducted by Nilgün Aytakin.

CONFLICT OF INTEREST DECLARATION

There is no financial conflict of interest with any institution, organization or person and there is no conflict of interest among the authors

REFERENCES

- Altun, Ş. (2023). Tekstil Üretim ve Kullanım Atıklarının, Geri Kazanımı, Çevresel ve Ekonomik Etkileri. *Uşak Ticaret ve Sanayi Odası Raporu*, p.21.
- Duran, A. & Temiz Dinç, D. (2016), The State of The Turkish Textile and Ready-Wear Industries. *İnsan ve Toplum Bilimleri Araştırma Dergisi*, 5 (3), p.505-519
- Ellen MacArthur Foundation (2017), A New Textiles Economy: Redesigning Fashion's Future. Retrieved 28 10, 2023 from Ellen MacArthur: <https://archive.ellenmacarthurfoundation.org/assets/downloads/A-New-Textiles-Economy.pdf>
- Ellen MacArthur Foundation (2019), Circular Economy System Diagram, Retrieved 28 10, 2023 from Ellen MacArthur: www.ellenmacarthurfoundation.org/circular-economy-diagram
- Ellen MacArthur Foundation (2021), Circular Business Models: Rethinking Business Models for a Thriving Fashion Industry. Retrieved 08 10, 2023 from Ellen MacArthur: <https://www.ellenmacarthurfoundation.org/fashion-business-models/overview>
- European Parliament (2014), 'The impact of textile production and waste on the environment (infographics)'. Retrieved 05 11, 2023 from Europarl: <https://www.europarl.europa.eu/topics/en/article/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographics>
- European Parliament (2024), EU Strategy for sustainable and circular textiles In “A European Green Deal”. Retrieved 13 08, 2024 from Europarl: <https://www.europarl.europa.eu/legislative-train/carriage/eu-textiles-strategy/report?sid=8201>
- Euratex (2020), Rehubs. Retrieved 28 10, 2023 from Rehubs: <https://www.rehubs.eu/copy-of-about-test/>
- Fashion for Good, Circle Economy (2022). Sorting for Circularity Europe: An Evaluation and Commercial Assessment of Textile Waste across Europe. Retrieved 28 10, 2023 from Fashionforgood: <https://reports.fashionforgood.com/report/sorting-for-circularity-europe/>
- Fernandez-Stark, P., Bamber, P., Couto, V. (2022), Analysis of the Textile and Clothing Industry Global Value Chains: Summary, *Cataloging-in-Publication data provided by the Inter-American Development Bank*, IDB Technical Note; 2625
- Gözet, B., Wilts, H., Manshoven, S. & Bakas, I.(2021). Progress Towards Preventing Waste in Europe — The Case of Textile Waste Prevention. *European Environment Agency Report*, 15/2021 Retrieved 05 11,2023 from European Environment Agency website: <https://www.eea.europa.eu/publications/accelerating-the-circular-economy>
- Halife, H. (2020), Analysis of Competitiveness of Turkish Textile Sector based on the Porter's Diamond Model. *Stratejik Yönetim Araştırmaları Dergisi*, 3(1), 27-49.
- ILO (2021), The Post-COVID-19 Garment Industry in Asia, Retrieved 14 08, 2024 from ILO: https://www.ilo.org/asia/publications/issue-briefs/WCMS_814510/lang--en/index.htm
- Janmark, J., Magnus, K., Strand, M., Langguth, N. & Hedrich, S. (2022), Scaling textile recycling in Europe—turning waste into value, *McKinsey&Company, Article*. Retrieved 05 11, 2023 from McKinsey: <https://www.mckinsey.com/industries/retail/our-insights/scaling-textile-recycling-in-europe-turning-waste-into-value>
- Kant, R. (2012), Textile dyeing industry an environmental hazard, *Natural Science*, Vol.4, No.1, p. 22-26

- Köhler, A., Watson, D., Trzepacz, S., Löw, C., Liu, R., Danneck, J., Konstantas, A., Donatello, S. & Faraca, G., (2021). Circular Economy Perspectives in the EU Textile sector. *JRC Publications Repository*, Retrieved 05 11, 2023 from European Commission: <https://publications.jrc.ec.europa.eu/repository/handle/JRC125110>
- Ministry of Foreign Affairs (2021). Defining Circularity of Textile Industry in Türkiye, retrieved 13 08, 2024 from Netherlands Enterprise Agency website: <https://www.rvo.nl/sites/default/files/2021/04/Circular%20Textiles%20Türkiye%202021.pdf>
- Mondal, P., Baksi, S., Bose, D., Study of environmental issues in textile industries and recent wastewater treatment technology, *World Scientific News* 61(2) (2017) p. 98-109
- Niinimamp et al., K., Niinimamp, G., Peters, H., Dahlbo, P., Perry, T. & Rissanen, A. Gwilt (2020). The environmental price of fast fashion. *Nat. Rev. Earth Environ.*, 14 (2020), 10.1038/s43017-020-0039-9
- Öner, E. (2023), Tüketici Sonrası Tekstil Atıklarının Geri Dönüşümüne Yönelik Tüketici Tutumlarının İncelenmesi, *OKU Fen Bilimleri Enstitüsü Dergisi* 6(3), p. 2010
- T.C. Sanayi ve Teknoloji Bakanlığı (2021). Tekstil, Hazırgiyim ve Deri Ürünleri Sektörleri Raporu *Sektör Bazlı Raporlar ve Analizler Serisi* Retrieved 14 08, 2024 from Sanayi ve Teknoloji Bakanlığı: <https://sanayi.gov.tr/plan-program-raporlar-ve-yayinlar/sektor-raporlari/mu2812011411>
- TİM (2024). İhracat Raporu 2024 Retrieved 13 08, 2024 from TİM: https://tim.org.tr/files/downloads/Strateji_Raporlari/ihracat_2024_raporu-2.pdf
- UNDP (2020). Sectoral Roadmaps: Textile Sector in Türkiye. Retrieved 14 08, 2024 from UNDP: https://www.undp.org/sites/g/files/zskgke326/files/migration/tr/Sectoral_Roadmaps_Textile_Sector_in_Türkiye-re2.pdf
- UNEP (2023). Sustainability and Circularity in the Textile Value Chain A Global Roadmap, Retrieved 05 11, 2023 from UNEP: <https://www.unep.org/resources/publication/sustainability-and-circularity-textile-value-chain-global-roadmap>
- Watson, D., Kiørboe, N., Palm, D., Tekie, H., Harris, S., Ekvall, T., Lindhqvist, T., & Lyng, K. (2014), EPR systems and new business models Reuse and recycling of textiles in the Nordic region, Nordic Council of Ministers. Retrieved 13 08, 2024 from Nordic Co-operation: <https://www.norden.org/en/publication/epr-systems-and-new-business-models-0>
- Wojciechowska, P. (2021). Fibres and Textiles in the Circular Economy, *Fundamentals of Natural Fibres and Textiles, The Textile Institute Book Series*, p. 691-717.
- Yorulmaz, H. (2023). Tekstil KOBİ'leri bağlamında yeşil işletme stratejisi motivasyonlarının AHP yöntemiyle önceliklendirilmesi. *Sosyal Mucit Academic Review*, 4(4), 477-502. doi: 10.54733/smar.1370063
- Zafer Kalkınma Ajansı (2019), Uşak İli Tekstil Geri Dönüşüm Sektör Raporu. Retrieved 13 08, 2024 from Kalkınmakutuphanesi: <https://www.kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/usak-tekstil-geri-donusum-raporu-tgdr.PDF> (Erişim Tarihi: 12 Temmuz 2024)