





### Circular economy awareness and motivations in the furniture industry: İnegöl as a microcosm of global south dynamics

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**ABSTRACT:** This study examines the distinctive characteristics of circular economy (CE) transitions in the Global South with the aim of elucidating the complex dynamics. The furniture cluster in İnegöl, Türkiye, is employed as a case study. A circular economy awareness survey is employed to illustrate the current perspective of the industry. In total, 40 companies from the cluster were reached, and the results were analysed using thematic analysis and descriptive statistics. Furthermore, a semi-structured interview was conducted with a key figure within the ecosystem to gain a deeper understanding of the barriers and motivations for potential CE transitions. The study's key findings reveal that companies operating in the Global South have less awareness of the coverage of CE with applications confined to waste reduction and energy efficiency in comparison to the Global North. Additionally, new design and innovation efforts are not identified among the expected benefits related to implementing CE. This paper highlights the fact that exporting companies from the Global South may face challenges for sustaining their competitive advantage in EU markets, particularly after the 2026 Net Zero CO<sub>2</sub> Plan due to their limited understanding of CE.

**Keywords:** Circular Economy, Furniture Industry, Design, Global South, İnegöl Furniture

### Döngüsel ekonomi farkındalığı ve mobilya endüstrisindeki motivasyonlar: küresel güney dinamiklerinin bir mikrokozmosu olarak İnegöl

**ÖZ:** Bu çalışma, karmaşık dinamikleri aydınlatmak amacıyla Küresel Güney'deki döngüsel ekonomi (DE) geçişlerinin ayırt edici özelliklerini incelemektedir. İnegöl, Türkiye'deki mobilya kümelenmesi bir vaka çalışması olarak kullanılmıştır. Araştırma, endüstrinin mevcut perspektifini göstermek için döngüsel ekonomi farkındalık anketi kullanmaktadır. Kümeden toplamda 40 şirkete ulaşılmış ve sonuçlar tematik analiz ve tanımlayıcı istatistikler kullanılarak analiz edilmiştir. Ayrıca, potansiyel DE geçişlerinin engellerini ve motivasyonlarını daha iyi anlamak için, ekosistemin önemli bir figürüyle yarı yapılandırılmış bir mülakat yapılmıştır. Çalışmanın ana bulguları, Küresel Kuzey'e kıyasla, Küresel Güney'de faaliyet gösteren şirketlerin DE kapsamına yönelik daha az farkındalığa sahip olduğunu ve uygulamaların atık azaltımı ve enerji verimliliği ile sınırladığını göstermektedir. Ayrıca, yeni tasarım ve inovasyon çabaları DE'nin uygulanmasıyla ilgili beklenen faydalar arasında tanımlanmamıştır. Bu makale, Küresel Güney'den ihracatçı şirketlerin, döngüsel ekonomi konusundaki sınırlı anlayışları nedeniyle yakın gelecekte, özellikle AB'nin 2026 Net Sıfır CO<sub>2</sub> Planı sonrasında, AB pazarlarında rekabet avantajlarını sürdürmede zorluk yaşayabilecekleri gerçeğine işaret etmektedir.

**Anahtar Kelimeler:** Döngüsel Ekonomi, Mobilya Endüstrisi, Tasarım, Küresel Güney

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## **1 Introduction**

The Circular Economy (CE) concept, which aims to extend product life cycles and minimise resource use and waste, is gaining traction in the business world (Suchek et al., 2022; MacArthur, 2013; Bocken et al., 2017). However, its implementation faces challenges related to costs, legislation, and managerial issues (Sarja et al., 2021; Acerbi and Taisch, 2020; Govindan and Hasanagic, 2018; de Jesus and Mendonça, 2018; Hoag et al., 2002). Transforming organizational structures and manufacturing techniques is necessary however it is a demanding process (Dubey and Bansal, 2012; Briguglio et al., 2021). CE and sustainability efforts also depend on the socio-economic structure of the society, the sector, market dynamics, legal regulations, openness of organizations to change and innovation (Pieroni et al., 2021). Often, the initial CE awareness is identified as a crucial barrier for firms to adopt CE principles (Kumar et al., 2019). Thus, there might be differences in transformation processes between the Global North and the Global South.

The furniture industry, which is vital for Global South economies and closely tied to civil construction and urbanization, faces sustainability challenges due to its reliance on virgin materials (de Oliveira et al., 2018; Azizi et al., 2016; Iritani et al., 2015). While Turkish manufacturers are making strides in waste reduction, they lag in resource productivity and waste management compared to EU standards (Koska and Erdem, 2023; Azizli, 2021). The study focuses on İnegöl that is a furniture industry cluster comprising 3000 companies (Url-1) located at the western of Türkiye surrounded by natural forests which have been the major resource for the industry for decades. İnegöl made 716 Million USD in furniture exports corresponding to 18% of Türkiye's total furniture exports in 2022 (Url-1). Türkiye had 2,06% share in global furniture exports with 4.6 Billion USD in furniture exports (Url-1) while Iraq, Germany and the US are Türkiye's three major export markets (Url-1).

This study addresses the following research questions by conducting an in-depth examination of the İnegöl case: i) what are the organizational awareness levels related to CE (if any?) at furniture companies operating in the İnegöl cluster? (ii) what are the major motivations and barriers in adopting CE capabilities and skills in the furniture industry in the Global South? and (iii) what are the potential design and policy implications of CE transitions in the Global South? The findings have the potential to offer insights for policymakers, industry stakeholders, and researchers in forming strategies for sustainable development in regions with distinct economic landscapes. The study also aims to address existing knowledge gaps by providing a detailed examination of the circular economy transitions in the Global South compared to the Global North.

The aim of this study is to explore motivations and barriers to CE transition in the Turkish furniture industry contributing to a broader understanding of sustainability efforts in design and production.

### **1.1 CE transition trajectories of global south**

Transition to CE requires a widespread strategy that takes economic, cultural and organizational characteristics into account. Countries of the Global North are often identified by their developed economies, levels of industrialization, infrastructure and technology, and higher income (Adomako et al., 2023; Odeh, 2010). Global South is associated with resource scarcity, low industrialization and developing economies (Pieterse, 2000). A nuanced understanding of the CE in the Global South requires the identification of specific challenges and opportunities derived from the socioeconomic environment, availability of resources and legislative frameworks (Muchangos 2022; Schröder et al., 2019).

Although industrialization levels and challenges may vary, the Global South is often characterized by (i) less advanced industrial and service sectors, (ii) lacking advanced technologies for facilitating CE practices such as smart manufacturing, waste management and recycling technologies, (iii) resource constraints hindering adoption of cutting-edge technologies, (iv) lack of advanced infrastructures for waste collection and recycling practices, and (v) underdeveloped regulations and legislations for environmental and social sustainability (Odeh, 2010). The CE practices in the Global South often face challenges such as improving environmental damage tracking, increasing the impact of waste minimization initiatives, and overcoming high implementation costs (Hira et al., 2022; Tahulela and Ballard, 2020). However, the countries of Global South have certain advantages for a potential leapfrogging by directly adopting newer and more sustainable technologies compared to developed economies which would also potentially make a significant improvement in the chronicle problems such as unemployment, waste, pollution and energy dependency (Schröder et al., 2019).

Regional characteristics are crucial factors fostering companies to develop eco-innovations (Arranz et al., 2022, Stern and Valero, 2021). Not only common cultural barriers such as consumer awareness and company culture but also market related barriers including low virgin material prices and high investment costs are identified as barriers to a transition to CE (Jan 2022; Kirchherr et al., 2017). Smaller companies often consider cost savings and compliance with the legislation over circular strategies (Ormazabal, 2018). Companies often voluntarily undertake environmental management practices due to customer-oriented approaches and differentiation strategies in developing countries (Tatoglu et al., 2020).

## **1.2 İnegöl: mass produced artisan furniture manufacturers' cluster of Türkiye**

The furniture industry began its industrial production in the 1970s in Türkiye. Currently, there are approximately 61,728 furniture establishments, employing 258,213 workers and operating in cities like Istanbul, Ankara, Bursa, Kayseri, Izmir, and Adana with automation beginning in the 2000s (Serin et al., 2014). The furniture cluster of İnegöl is situated in Bursa and comprises 3000 companies as of 2023 (Url-1). İnegöl has a rich history in furniture production starting from the Ottoman period by crafting oars for the navy. A systematic growth of furniture manufacturing was observed since 1943 after the establishment of the Turkish Republic (Url-1). İnegöl concentrated on the production of chairs during the 1960s. The İSTAŞ cooperative was established for the production of chipboard, specifically MDF and particleboard in the early 1980s (Araz and Yaşar, 2020). Since then, İnegöl not being a heavily populated city has shifted towards mechanized production turning craftsmanship into mass production. The internationalization of the sector was boosted by the increasing number of furniture fairs in the early 1990s. Local furniture fairs have improved in size, quality, and frequency since 1985. These events have become crucial for the industry and the city of İnegöl by being regularly organized twice a year (Url-2). The Turkish furniture sector is pioneering, developing new products and concepts, and keeping a close eye on global trends.

## **1.3 Circular economy in the scope of İnegöl furniture industry**

The literature examining CE in the context of the furniture industry frequently highlights the depletion of resources and deforestation (Azizi et al., 2016; Iritani et al., 2015), supply chain collaborations (Susanty et al., 2020), extended producer responsibility (Nozharov, 2019), industrial symbiosis and circular product concepts (Oliveira et al. 2020), solid wood recovery strategies (Husgafvel et al., 2018), standardization of components, introduction of modular products, using reclaimed materials, and improving reuse practices (Agrawal et al., 2021; Wicaksono and Kadafi, 2020; Barbaritano et al, 2019; Azizi et al., 2016). Improvement

of manufacturing processes and overcoming organizational changes in the framework of CE requires a systemic transition (Yalçın and Foxon, 2021), establishing new business models (Koszevska and Bielecki, 2020), and effective reuse and recycling strategies in furniture industry (Barbaritiano et al., 2019).

The furniture manufacturers of İnegöl have made relative progress towards increasing the share of renewable energy use in their overall consumption (Bursa Belediyesi, 2022) which is a common pattern in overall Türkiye due to introduced legislations encouraging renewable energy production and consumption (Çelik and Özgür, 2020; Eser and Polat, 2015). The furniture manufacturers of İnegöl deal with reducing the waste by increasing the recycling capacities within the waste treatment regulations of the local municipality (Gödel and Beyhan, 2021; Salihoğlu et al., 2019) in line with the zero-waste initiative of the government (Ayçin and Kayapınar, 2021). The furniture manufacturing industry is making strides to lessen its environmental footprint, particularly in chemical usage during painting and chipboard production (Syeda et al., 2022; Vaajasaari et al., Adhikari and Ozarska 2018). Transitioning to eco-friendly materials is a significant move for İnegöl's ecosystem. Challenges like water consumption and inadequate filtration systems need addressing (Adhikari and Ozarska 2018). Furthermore, the absence of environmental regulations and industry norms may hinder the shift towards a CE.

## **2 Method**

### **2.1 Research method**

This study uses a qualitative approach to investigate awareness levels and barriers to CE in İnegöl furniture companies due to the exploratory nature of the research. The main data collection method was an online survey utilizing the questionnaire developed by Kumar et al. (2019). The survey was prepared on the Qualtrics platform and the link was sent to the companies among the İnegöl's furniture exporters list. The online survey consists of 28 questions including 12 company profile and demographics related questions, four open-ended questions about the circular economy concept, two questions about employees' awareness of the circular economy and ten questions adapted from Kumar et al (2019) which are presented in Figure 2.

The Waste Hierarchy Framework developed by Potting et al., (2017) was used to analyse qualitative data on the transition from linear to circular economy. The framework suggests 10 strategies for transition from linear to circular economy with the highest-level strategies (refuse, rethink, reduce) focusing on the efficient use of products and manufacturing operations.

Thematic analysis was also used to develop additional categories to analyse qualitative data. Additionally, we used Qualtrics based descriptive statistics to elaborate on the survey results and interpret data clearly and concisely. Moreover, a semi-structured interview with a key person from a major NGO focused on furniture manufacturers in İnegöl was conducted to gain a better understanding of the cluster and its circular economy perspectives.

### **2.2 Sample Population of Survey**

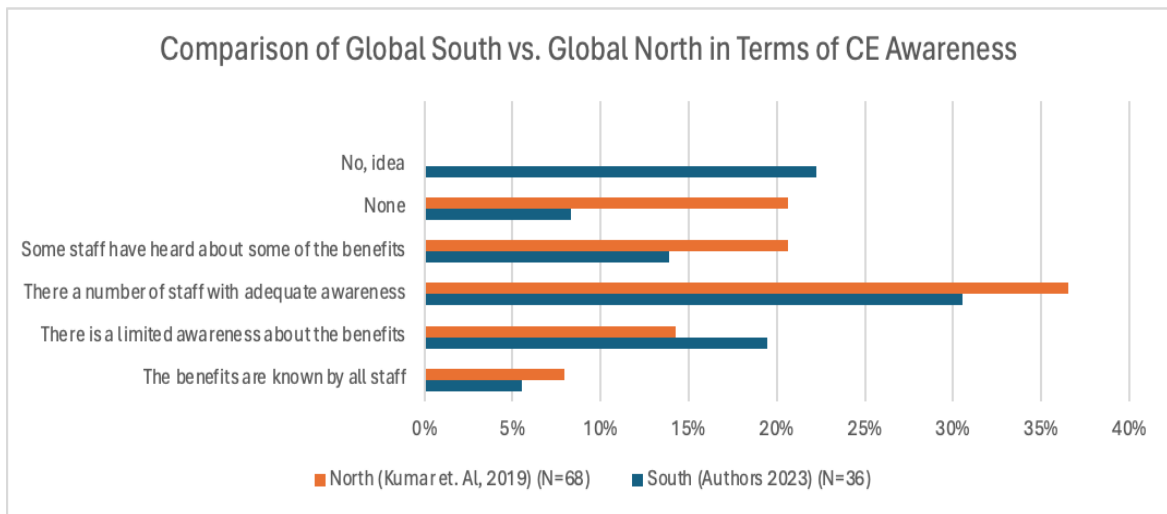
In their research, Kumar et al. (2019) use 63 valid responses received from the survey conducted in developed economies (EU and UK) from various industries from automotive to paper products. We used the list obtained from the İnegöl Furniture Manufacturers Association, which contains 198 exporter members, to gather a deeper understanding of the CE awareness of the Turkish furniture industry (Url-3). We decided to approach them initially as we assumed that exporting companies are more likely to be knowledgeable about the

circular economy. We received 40 valid responses (with a response rate of 20%) between September-December 2023. The survey encompassed responses from 40 firms predominantly medium and small-sized enterprises. There were 4 large size ( $n > 250$ ), 21 medium size ( $250 > n > 50$ ), 11 small size ( $50 > n > 10$ ) and 3 micro size ( $n < 10$ ) companies in the sample. The minimum export to sales ratio turned out to be 10% whereas the maximum was 100% with a mean of 50,61 % (SD. 24,63%).

### 3 Findings and discussions

#### 3.1 Organizational awareness levels to circular economy

21 companies out of 36 indicated prior awareness of the circular economy concept while 15 had not encountered it in our findings. Moreover, approximately one-third (13/36) of the surveyed firms claimed involvement in circular economy-related activities (Figure 1).



**Figure 1:** Comparison of Global South vs. Global North in Terms of CE Awareness

Open-ended questions revealed that only five R's were mentioned in the survey responses (see Table 2). Responses highlight that the industry is generally familiar with the concept of recycling. Interestingly, none of the respondents mentioned "recovery" in their answer, yet it is a common practice in the industry to incinerate the leftover wooden parts in the facility according to our interview. The concept of "waste" was highlighted as a critical issue of the CE and identified as an additional category in the thematic analysis. Moreover, cost reduction expectations aligned with optimizations in production processes and increased quality were identified as other prominent categories by gaining economic advantage through design.

The common practice of incineration, which is the lowest level of the waste hierarchy, corresponds to the CE challenges of the Global South such as the lack of developed infrastructures for waste collection, increasing the impact of waste minimization initiatives, recycling and reuse practices highlighted in the literature (Hira et al., 2022; Tahulela and Ballard, 2020; Odeh, 2010;). Yet, it is possible to argue that the sector is somehow aware of the potential of CE transitions to contribute to tackling the country's chronic economic and environmental problems which could also contribute to the leapfrogging potential (Schröder et al. 2019).

Furthermore, none of the respondents mentioned eliminating the usage of hazardous chemicals or composite compounds unable to be recycled as potential improvements for CE. It is noteworthy that two respondents have identified societal transformation and reduction of

consumption as elements of their conceptualisation of CE. However, it is unclear how these concepts are operationalised in practice.

**Table 1.** Survey Analysis of Open-Ended Questions

<b>Open ended questions</b> (x) frequency of the same answer <b>Q1:</b> What do you think the circular economy concept is about? Can you explain it with a few words that come to your mind immediately? 26 participants answered. (n=35) <b>Q2:</b> What are the 3 pillars of a circular economy? 14 participants answered (n=35)			
<b>Thematic analysis of open-ended questions</b>			
<b>Waste Hierarchy Categories Adopted from (Potting et al., 2017)</b>		<b>Additional Categories</b>	
Refuse	None	Waste	transformation of waste to regain for economy, regeneration instead of disposal (2), using materials with zero waste, minimum waste, ringing waste back to economy, preventing waste (3)
Rethink	None		
Reduce	reduce (5)		
Reuse	reuse (6) and long term,	Economic advantage	design, value added product, transformative products, shaping economy, profitability, opportunity cost, marginalism, effective markets, competitive advantage, repetition of economy, econometrics, saving
Repair	repair (2)		
Refurbish	renew (2)		
Remanufacture	None	Sustainability	sustainability (3), long term use (3), transforming society- not consuming (2), regenerative energy, regenerative, repeating, ongoing, operating
Repurpose	None		
Recycle	recycle (14), recycle & long term, recycle & profitability (2), using recyclable materials, production based on recycle, a production & consumption based recycle recyclable process	Production processes	production, quality increase, sustainable production & raw material process, efficient prod. for the manufacturing industry, optimization
Recover	None		

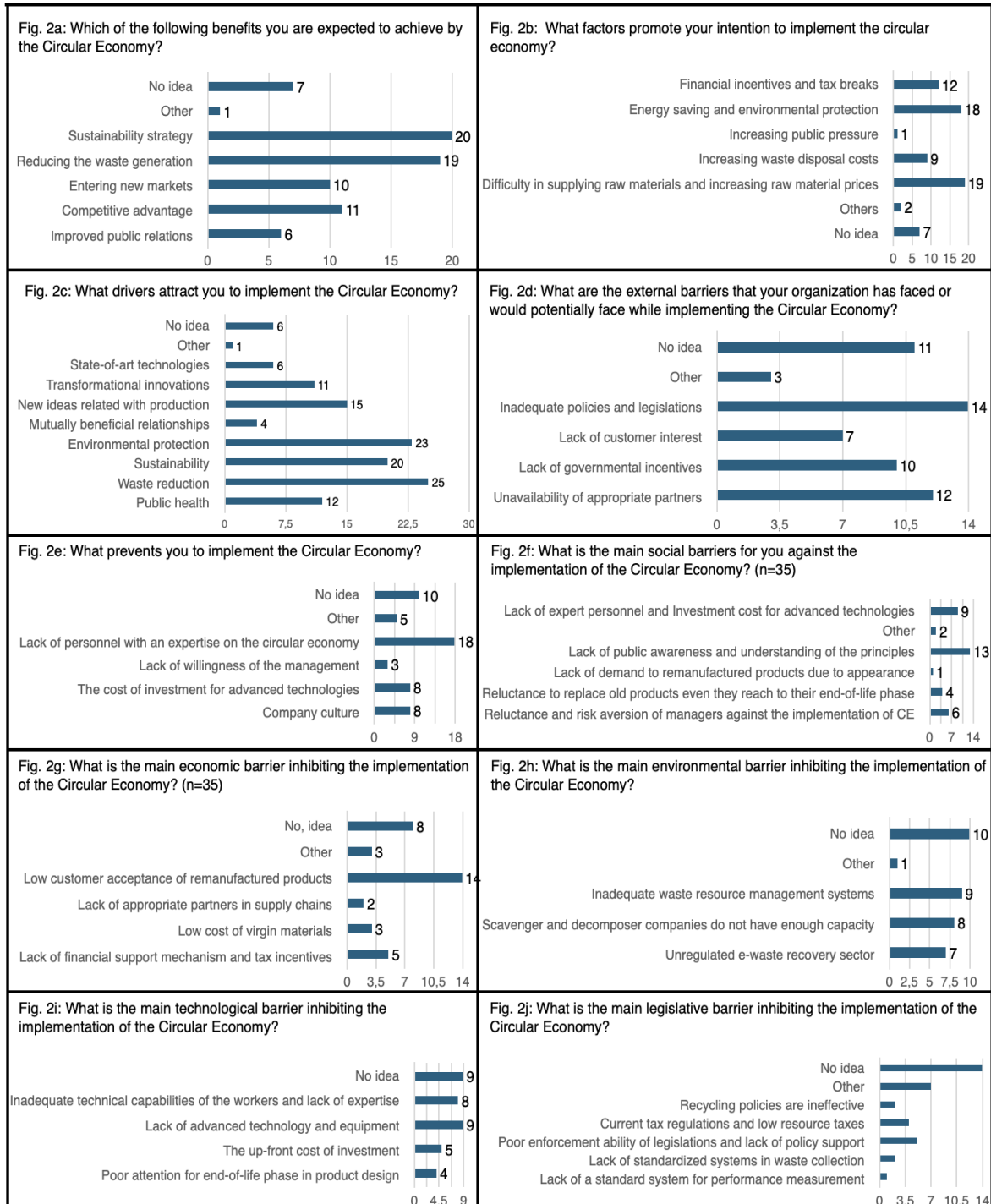
### 3.2 Motivations to circular economy

Companies are adopting circular economy strategies to enhance sustainability, gain competitive advantage, and expand into new markets. Import-export regulations are crucial for Turkish furniture manufacturers to implement circular economy strategies, particularly in European countries. Local engagement with municipal regulations also influences waste reduction, leading to the development of specific waste management and treatment protocols. These factors are intertwined in achieving sustainable growth.

#### 3.2.1. Environmental protection, reduction of waste and energy costs

Reducing waste generation (26,76%) and sustainability strategy (26,76%) were mentioned as top-ranking benefits of adopt CE (Figure 2a) which were similar with the existing literature and did not highlight a nuance between developed and developing countries. Mostly economic factors such as increasing resource prices and scarcity (27.94 %), and energy saving and environmental protection (26,47 %) were found to be the top-ranking factors promoting the intention to implement the circular economy by İnegöl exporters (Figure 2b). Energy saving and environmental protection were also mentioned by Kumar et. al. (2019) as the top-ranking factor in developed countries.

Waste reduction (20.16 %) and environmental protection (18.55 %) were identified as the most attractive drivers to implement CE (Figure 2c) which differs from the existing literature. While Kumar et. al (2019) illustrated that sustainability and new ideas related with production are major drivers to attract manufacturers to implement CE in addition to waste reduction.



**Figure 2.** Findings Related to the Benefits and Barriers to CE

### 3.2.2. Reuse of materials and components

We inquired about the exemplary activities undertaken by the respondents' companies about the circular economy. Three respondents elaborated on the use of faulty products and waste for R&D purposes and samples. Respondents indicated that the residual materials from

the wooden frame, fabric, and polyurethane foam, which have not been sold, are frequently utilized as a filler for cushions. One participant indicated that wood pieces that would otherwise be destined for recycling are utilized for the production of regular products. Additionally, respondents noted the reuse of packaging waste and further elaborated that sponges and nylon are recycled. One of the respondents elaborated in detail about the activities in the company related circular economy and concluded with an example of CE implementation: "...CE is about creating different values from a single material, for example, designing a coffee table from the remaining part of a ceramic painting after being used on the table."

### **3.2.3. Introduction of supportive legislations and potential export markets**

The furniture companies in İnegöl are prohibited from discarding waste materials such as particleboard, MDF board, fabric, and sponges according to our interviewee (Interviewee 1, 2024). These waste materials are collected in separate containers designated for each company and the companies pay a certain fee for these containers. While particleboard materials are sent back to production factories for recycling, sponge and fabric remnants can be recycled to some extent. Consequently, it can be argued that the improvements in the companies' sustainability performances, especially in terms of recycling, are a consequence of local municipalities' waste management legislation.

### **3.2.4. Economic advantage**

Existing research on furniture clusters indicates that CE necessitates a diversification of practices beyond conventional recycling (Ghisellini and Ulgiati, 2020). Furthermore, our findings suggest that the furniture industry of İnegöl tends to approach CE from an economic advantage perspective. They anticipate that CE might enhance their profitability, gather competitive advantage, facilitate the development of value-added products, and facilitate cost reduction through transformative products. However, they were unable to identify any production process-related innovations that could support such a change except optimisation, quality and efficiency. Consequently, it can be argued that the industry is still unfamiliar with higher-order strategies such as the waste hierarchy, design-driven sustainability and business model innovation.

## **3.3 Barriers to circular economy**

### **3.3.1 Lack of government policies**

Participants were asked about the CE barriers from the social, economic, environmental, technological and legislative perspectives. Remarkably, companies recognize inadequate policies and legislations (24,6%), and the unavailability of suitable partners (21%) as a significant external barrier to overcome in implementing CE initiatives as illustrated in Figure 2d. The lack of government incentives was identified as the top-ranking factor in developed countries (Kumar et al, 2019). In our study, 37.14 % of the participants stated the lack of public awareness and understanding as the main social barrier to CE. This finding is parallel with the existing literature (Kumar et al. 2019; Benton et al., 2015). There is an effective resource management in the scope of forestry according to the interviewee. However, it is not possible to claim that industrial forestry or similar applications are encouraged with regulations (Interviewee 1, 2024).

While circularity in Europe is supported by the state, İnegöl is still developing in terms of sustainability since such support has not yet developed in Türkiye. (Interviewee 1, 2024). They may lack preparation about the directives in the framework of the Green Deal which will be implicated in the near future. Yet, the lack of government-level plans and detailed net-



zero CO<sub>2</sub> plans also make the process challenging for firms. Many industries will probably experience a decline in market share including the Turkish furniture industry which currently has Germany as its second largest export market. As our interviewee highlighted, İnegöl in terms of CE applications in the context of the Green Deal has initiated four EU-supported projects all of which relate to the use of renewable energy sources (Interviewee 1, 2024). On the other hand, our interviewee claims that the İnegöl furniture exporters will quickly respond to the changing legislations and market expectations:

*İnegöl has the capacity to adapt to the trend of circular economy and sustainable design when it becomes a global trend as a city and production center that follows trends. The trends always come from the West and we follow them. So far, we have not observed a dominant trend for circular furniture design in the global market. When we do, we will be ready to adapt to it as usual.* (Interviewee 1, 2024)

A recent case study of a furniture company in Türkiye revealed that the evaluated company's operations aligned with CE principles (Şenkal, 2023). Germany is part of the Green Deal initiative as a significant export market for Türkiye. Therefore, Türkiye should adopt the Net Zero CO<sub>2</sub> Plan until 2026 despite currently lacking policies in this area (TUSIAD, 2021). Consequently, it is possible that Türkiye may have to consider shifting its export markets instead of fully adopting the Green Deal goals. Demirel and Kesidou (2019) posit that companies must cultivate their capabilities to effectively navigate regulatory processes.

### **3.3.2. Lack of partnerships and expertise**

Although industrial symbiosis and supply chain collaborations are highlighted as critical CE strategies in the scope of furniture industry (Susanty et al., 2020; Oliveria et al. 2020), our respondents exhibit less enthusiasm towards embracing mutual benefits or fostering increased industrial symbiosis such as an ecosystem approach through circular economy transitions as seen in Figure 2c. This reluctance could stem from a limited perception of the potential mutual benefits between industries or a relatively conservative stance towards adopting circular transformational innovations in the Global South.

As seen in Figure 2e, respondents identify a lack of personnel having expertise in CE as a factor preventing them to implement CE (n=18). This perception may deter their adoption of circular practices. Furniture manufacturers of İnegöl perceive the cost of advanced technology investment as a less important factor (Figure 2e) compared to the survey results of Kumar et. al. (2019) which points out investment for advanced technologies as the main factor preventing companies to implement CE strategies. The reason behind this difference might be stemming from the industry's perception of circular products and processes as not requiring technological novelty.

### **3.3.3 Lack of public awareness and consumer interest**

İnegöl's furniture manufacturers consider increasing public pressure notably less as a factor promoting their intention to implement circular economy (Figure 2b) which might be a common barrier for industries of the Global South to adopt CE strategies compared to the results of the study of Kumar et. al. (2019).

From the economic perspective low customer acceptance of remanufactured products with 40% was identified as the main barrier which does not align with the findings of Kumar et al. (2019) and Benton et al. (2015). The former study identified the lack of appropriate partners in the supply chain and the latter study mentioned the lack of financial support mechanisms as the main barriers. However, Hazen et al. (2017) identified consumer's attitudes toward

remanufactured products as an important moderating factor in predicting consumer switching behaviour to remanufactured products. Panwar (2023) highlighted the importance of cultivating market support and pushing for regulations at the same time. We conclude that Global South customers are less willing to accept remanufactured products compared to Global North customers according to the industry.

Existing research indicates that levels of public awareness and pressure concerning sustainability are relatively low in Türkiye compared to EU countries (Korkmaz, 2018; Nazli, 2016). Consequently, increasing public pressure is not a motivating factor for companies to adopt CE strategies as illustrated in Figure 2b. However, respondents identify lack of public awareness (Figure 2f) and understanding about CE principles (n=13) as the main social barrier for implementing CE strategies. Similarly, low consumer acceptance of remanufactured products (n=14) represents a significant social and economic barrier impeding the implementation of circular economy practices in Türkiye as illustrated in Figure 2g.

### 3.3.4. Lack of understanding on CE obstacles

Figures 2h and 2i demonstrate that furniture manufacturers in İnegöl lack a clear understanding of the environmental and technological obstacles associated with the circular economy. 28.57% of participants indicated that they were unaware followed by 27.71% who cited inadequate resource and waste management systems with regard to environmental barriers. We identified a significant emphasis on recycling in open-ended questions which allowed us to conclude that the respondents' awareness and knowledge of the circular economy is limited and often only linked to waste and resource management. Kumar et al. (2019) have also identified inadequate waste and resource management systems as the key environmental barriers to CE. The lack of advanced technology was identified as the primary obstacle (25.71%) from the perspective of technical barriers in alignment with existing research (Kumar et al., 2019).

Regarding legislative barriers, 40% of the participants stated that they had no idea which was expected since there was little trace of CE awareness and applications in a developing country context. Ineffective recycling policies and tax regulations were identified as the most important factors in developed countries. De Jesus and Mendonça (2017) claim that academic literature still focuses mostly on technologically-based innovation and grey literature sources (and in particular EU reports) increasingly refer to systemic innovation barriers in CE. We identified both technological and systemic barriers to CE in our study. On the other hand, we believe that it is important to point out the high ratio observed in the “I have no idea” choice. Figure 3 demonstrates the ratio of the ‘I have no idea’ responses for each factor.

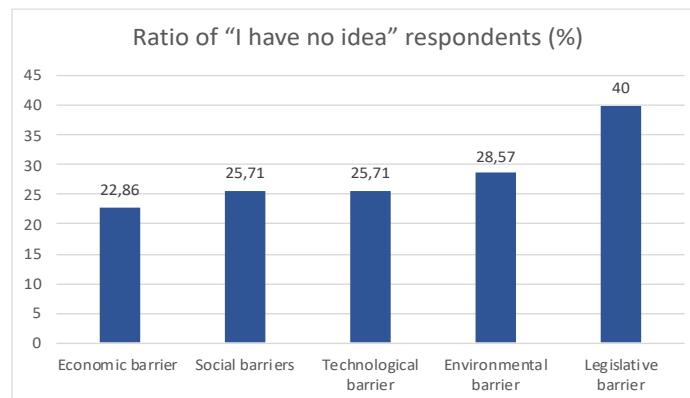


Figure 3. Rate of “No Idea” Respondents on External Factors

At least one fifth of the population was unaware of the barriers related to the CE as illustrated in Figure 3. This may be considered as a sign of low awareness about CE. In particular, legislative barriers were the least familiar to our participants compared to all external factors. They were found to be quite confusing and difficult for them to envision.

### **3.4. Patterns of adoption of CE strategies in global south**

Companies in emerging markets may voluntarily enhance their processes in response to customer expectations or in alignment with their differentiation strategies (Tatoglu et al., 2020). Our findings indicate that furniture manufacturers in İnegöl are attempting to improve their products and processes in response to external factors such as the potential loss of a market or the introduction of new legislation. This may be a common pattern in the Global South.

Industries are more willing to adopt CE strategies that have primarily cost-cutting effects such as waste reduction, process optimization, recycling, reuse, and renewable energy use; and are more distant from innovations that require long-term relationships, technological investment and systemic changes. The results don't support new ideas or innovation expectations in our findings. The respondents were mainly concerned with the optimization of processes and efficiency to tackle the challenges of CE transitions while design and innovation were not identified among their top strategies. Additionally, government policies, legislations and market pressure might be a driving engine for industries in the Global South.

#### **3.4.1 Design and policy implications**

Our study shows that furniture firms in İnegöl have material selection level design strategies and process optimisation approaches for CE. However, the circular design also covers more advanced approaches such as modularisation, extended producer responsibility and improved reparability. Implementation of such strategies requires the cooperation of various sectors. The introduction of government policies that support cross-industry partnerships and legislation that incentivises industry transition to respond to advanced market requirements will be beneficial for CE transitions in the Global South. Furthermore, industry awareness of CE strategies, benefits and barriers can be increased through training programmes, university-industry collaborations and CE-focused competitions and fairs.

## **4 Conclusions**

This study aimed to reach the large population of the İnegöl furniture manufacturers and reflects the preliminary results of the research due to the limited number of respondents (20% of total population). It is not possible to claim that the study represents statistically meaningful results, yet, survey results provided enough data (n=40) to analyse the awareness levels qualitatively. Increasing the number of semi-structured interviews with participants not only from the manufacturers but also from local municipalities and policy makers would be a future study to gain a better understanding about the ecosystem and to develop elaborated policy recommendations.

- In our study, awareness related to CE was found to be low among furniture exporters of İnegöl. We identified substantial emphasis on recycling and resource management in open-ended questions. CE related exemplary applications were confined to the reuse of materials such as sponge, nylon, wood and ceramic. This can be also considered as a sign of the limited awareness and knowledge of the respondents about CE.
- According to our study, cost saving and efficiency are prominent motivational factors related to the circular economy which reflects the Global South perspective.

- We also found that customers from the Global South are less willing to accept remanufactured products compared to the developed market customers.
- Looking from a design and innovation perspective, existing literature states that in addition to waste reduction, new ideas related with production are major drivers to attract manufacturers to implement CE in the Global North where redesigning products with CE perspective from the very beginning turns out to be important (Briguglio et al., 2021). We have identified limited emphasis given on innovation through CE in the Global South in our study.
- To adopt the Net Zero CO2 Plan, Türkiye lacks policies and furniture manufacturers lack awareness. So, there is a possibility that Türkiye may lose its EU furniture markets after 2026 and shift its export markets to other geographies

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### **Author Contributions**

**Serkan Bayraktaroğlu:** Conceptualization (developing the research idea and objectives), Determining the methodology, Visualization, Sources, Drafting the manuscript, Writing, reviewing and editing the manuscript. **Yasemin Soylu:** Conceptualization (developing the research idea and objectives), Determining the methodology, Conducting the research, Conducting the analysis, Data refinement, Sources, Visualization, Drafting the manuscript, Writing, reviewing and editing the manuscript.

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### **Conflict of Interest**

We confirm that there is no conflict of interest.

### **Compliance with Ethical Standards**

This study was approved by the Istanbul University Social Sciences and Humanities Ethical Committee (Study reference no: 2023/1696897).

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