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CIRCULAR START-UPS IN TURKEY: AN EXPLORATORY STUDY*

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ABSTRACT

As the world population grows, the need for transition from a linear economy to a circular one is increasing. Such a transition can be made possible through the conversion of existing business models as well as the introduction of new, circular ones. When it comes to application, circular business models can be adopted by both existing companies and start-ups. Among these two, academic research has traditionally focused more on existing companies. Therefore, more studies are needed on circular economy related activities of start-ups. As an exploratory study, this research analyses circularity strategies and circular business models used by start-ups within Turkey. The analysis is based on the data collected from 47 companies. As a result, we found that most frequently used circularity strategy by circular start-ups in Turkey is Recycling, followed by Rethinking. As for circular business models used by these companies, we observed that Next Life- Extending Resource Value and Collaborative Consumption-Sharing Platform models are the most popular ones. In addition, we suggest that circular start-ups in Turkey can be categorised under five categories:1) Recycling Companies, 2) Sharing Based Endeavours, 3) Recycled Material Users, 4) Second-Hand Product Marketplaces, 5) Waste Management Platforms.

Keywords: *Circular Economy, Entrepreneurship, Start-up, Circular Business Models.*

JEL Classification Codes: *L26, M13, Q01.*

TÜRKİYE'DE DÖNGÜSEL GİRİŞİMLER: KEŞİFSEL BİR ÇALIŞMA

ÖZET

Dünya nüfusu çoğaldıkça ulusların lineer ekonomi anlayışını terk ederek, döngüsel bir ekonomi modeline geçiş yapmaları ihtiyacı artmaktadır. Bu yönde bir dönüşüm mevcut iş yapış biçimlerinin değişmesiyle olduğu kadar, yepyeni iş modellerinin kullanılmaya başlamasıyla da mümkün olacaktır. Uygulamada, döngüsel ekonomi anlayışıyla uyumlu bu yeni iş modellerinin hem mevcutta kurulu olan, hem de yeni kurulmuş işletmeler tarafından hayata geçirildiği görülmektedir. Bununla beraber, akademik çalışmalar çoğunlukla kurulu şirketlerin uygulamalarına odaklanagelmiştir. Bu yüzden yeni kurulan işletmelerin döngüsel uygulamalarının daha fazla incelenmesine ihtiyaç duyulmaktadır. Bu noktadan hareketle keşifsel bir çalışma olarak tasarlanan bu araştırma Türkiye'deki yeni kurulan şirketlerin döngüsel stratejilerine ve iş modellerine odaklanmıştır. Araştırma kapsamında 47 firma mercek altına alınarak incelenmiştir. Sonuç olarak, Türkiye'de yeni kurulan döngüsel işletmelerin en çok Geri Dönüşüm stratejisini uyguladıkları görülmüştür. Bunu Yeniden Ele Alma stratejisi takip etmektedir. Bu şirketlerce

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uygulanan iş modellerine bakıldığında, en çok Ürünün Sonraki Hayatı- Kaynak Değerini Uzatmak ve Paylaşım Platformu iş modellerinin kullanıldığı gözlemlenmiştir. Araştırma sonuçlarına göre, Türkiye'deki döngüsel işletmeler şu beş kategori altında toplanmaktadır: 1) Geri Dönüşüm Şirketleri, 2) Paylaşım Temelli Girişimler, 3) Geri Dönüştürülmüş Malzeme Kullanan Girişimler, 4) İkinci-el Pazaryeri Uygulamaları, 5) Atık Yönetim Platformları.

Anahtar Kelimeler: *Döngüsel Ekonomi, Girişimcilik, Yeni Girişim, Döngüsel İş Modeli.*

1. Introduction

1.1. Brief Overview of Circular Economy Awareness and Related Activities in Turkey

As in many concepts, there are various definitions of circular economy potentially reflecting lack of consensus among related parties (Cullen & De Angelis, 2021; Özsoy, 2018; Pollard et al., 2021). Nevertheless, based on their analysis of 114 definitions, Kircherr et al. (2017:229) propose a comprehensive definition of circular economy that is worth considering:

> *"An economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/ distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations".*

In simple terms, circular economy is a concept that refers to cleaner production, use of renewable energy and materials, elimination of toxic chemicals and waste, and increased manufacturer and consumer responsibility (Gedik, 2020).

Circular economy can be considered a new concept in Turkey and the entrance of it to agendas of related parties in the country dates back to the announcement of the first Circular Economy Action Plan of the European Commission in 2015 (Ünlütürk et al., 2021). Two institutions can be mentioned as the pioneering ones that majorly contributed to the introduction of the concept to Turkey in 2016. These are the Business Council for Sustainable Development Turkey (SKD Turkey) and the European Bank for Reconstruction and Development (EBRD) (Güngör, 2019). The developments on circular economy in Europe can be seen as an important factor that increases interest in the country towards the topic since many industries and companies in Turkey who are doing business in Europe are expected to be affected from related changes (Veral, 2021).

Up until 2021, the discussions on circular economy in Turkey have mostly evolved within the contexts of plastic pollution and zero waste (Blau & Janssen, 2020). There is official support for the EU Green Deal, but there is no National Circular Economy Action Plan in Turkey (Balbay et al., 2021). Also, it is difficult to talk about the existence of subsidies or tax-benefits to support circular business development in the country (Blau & Janssen, 2020). Therefore, on the state level, the support for circular economy as a whole can be considered to have remained at a limited scale up until 2021 and was mostly shaped with the effect of the EU Green Deal (Balbay et al., 2021). Nevertheless, there are several positive developments that are parallel to the understanding of circularity. For instance, the country accepted the National

Recycling Strategy and Action Plan in 2017 (Varır & Gürtepe, 2018). Moreover, at the end of 2020, the Turkish Environment Agency was established by the state and has been working in line with circularity principles and zero-waste understanding (Blau & Janssen, 2020).

There are several civic society organizations working to promote circular economy in Turkey. A very important and pioneering organization is SKD Turkey which was mentioned before. Supported by large-scale, established companies of Turkey, this organization is highly credited for an application called the Turkey Materials Marketplace - an online platform that companies can use to sell their waste materials with the potential to be used as input for other companies (Güngör, 2019; Blau & Janssen, 2020; Küçükaltan, 2020). SKD Turkey assumes an executive role in the Turkey Circular Economy Platform which provides training and consultancy services to companies who would like to operate in line with circularity principles (Balbay et al., 2021). Another high impact organization that promotes circular economy in Turkey is the Turkish Industry and Business Association (TUSIAD). This association has recent publications to increase awareness on the potential implications of the Circular Economy Action Plan for Turkish companies (Emil, 2021) in the country. TUSIAD has also issued a Declaration of Attitude For Transition to Circular Economy in Turkey which includes its suggestions to policy makers (TUSIAD, 2021). Another non-governmental organization to be mentioned is Circular Economy Cooperative D-Cube; founded in 2018.

This organization works in cooperation with the Technological Research Council of Turkey (TUBITAK) and supports development of circular start-ups (Güngör, 2019). The Foundation for Environmental Protection and Waste Packaging Materials Management (CEVKO) is another institution which promotes circular economy in Turkey. Taking on extended manufacturer responsibility of almost 2000 firms in the country regarding plastic recycling, this foundation has undersigned international congresses and workshops to increase awareness on circular economy in Turkey (Blau & Janssen, 2020). Apart from those local organizations, EBRD also deserves being credited since it helps financing circular economy related projects in the country. In 2015, EBRD launched the Zero Waste NØW, a project that aims to decrease waste and is based on the principles of industrial symbiosis (Güngör, 2019; Blau & Janssen, 2020). As a final point, it should also be noted that, one of the state universities in Turkey opened a graduate level program on circular economy (Balbay et al., 2021).

As far as the practices of Turkish companies are considered, it can be said that there is a certain level of interest towards the concept of circular economy on the side of some large-scale, established companies in Turkey. In that sense, Arçelik, Şişecam, Vestel and Sütaş are some of the well-known Turkish companies that have programs in support of circular economy (Blau & Janssen, 2020; Ünlütürk et al., 2021; Güngör, 2019). As a matter of fact, many other companies, especially the ones with export operations to Europe, have also started to act more in line with circularity principles (Balbay et al., 2021). However, when it comes to small and medium sized firms, most Turkish companies of this sort may still be considered reluctant to take risks in switching their accustomed way of operations which are in line with the linear economy (Güngör, 2019). Despite the aforementioned relative reluctance of small and medium sized firms, there are also successful circular start-ups in Turkey (Ünlütürk et al., 2021). It is believed that the activities of these start-ups are worth taking a closer look in understanding the course of Turkey on the route to circular economy since entrepreneurial activities may play

a role in the structural transformation of an economy (Gries & Naude, 2008). Indeed, circular economy itself represents a systemic transformation (Circularity Gap Report, 2021) and, as potential change agents, entrepreneurs may be expected to have a considerable role in this transformation.

1.2. About the Research

Acting as a pioneering and exploratory study on the activities of start-ups in Turkey that align with circular economy principles, the purpose of the research is to: 1) obtain an overall picture of circular start-ups in Turkey, 2) understand their strategic choices, and, 3) check adoptability of existing circular start-up typologies to Turkey, and/or, if possible, propose a typology based on the Turkish case.

Basically two research questions are addressed in this paper: Question 1: which "circularity strategies" are being followed by the circular start-ups in Turkey? Question 2: what kind of "circular business models" are being used by these companies?

When it comes to the added value of this research, it should be noted that there is not enough knowledge accumulation about companies that operate in line with circular economy principles (Cullen & De Angelis, 2021). As for the specific case of start-ups, the level of available information drops even further as research on circular economy has mostly focused on the practices of established companies, and the contributions of start-up companies are neglected to a great extent (Henry et al., 2020). Parallel to this general situation, to the knowledge of the authors, academic studies on circular start-ups are very limited in Turkey. Therefore, from an academic point of view, this research will help shed light on a not-so-well-discovered terrain and is expected to inspire further studies in Turkey.

On the other hand, this study is also expected to provide insights on the potential contribution of *being circular* to a company in terms of its business model. Indeed, even though academic research on circular business models is increasing (Cullen & De Angelis, 2021), further empirical studies are needed to clarify the ways that companies use in creating value in line with circularity principles (Urbinati et al., 2017:488; Urbinati et al., 2020; Centobelli et al., 2019). Therefore, from a practitioner point of view, the findings of the research may encourage practitioners to consider establishing companies that are in line with circularity principles or modify the business model of existing companies accordingly.

The rest of this paper is organised as follows: The literature review in Section 2 begins with an overview of the circular economy concept in general and then explores it in an entrepreneurial context. Later, the theoretical framework that forms the backbone of the research is presented. In Section 3, the research methodology is explained. It is followed by the presentation of research findings in Section 4. After this, the last section of the paper is spared for the conclusion and discussion of the findings.

2. Literature Review

2.1. Circular Economy in More Detail: Difference from Linear Economy and Benefits

Circular economy represents an alternative economy approach to the current and dominant economy understanding which is usually called *linear economy* or in some cases *cowboy*,

open-ended and *traditional* economy (Özsoy, 2018; Urbinati et al., 2017). This linear model is based on the *take-make-dispose* approach in production and consumption of goods and services (Gedik, 2020; Veral, 2021). The linear model represents the basis of the majority of existing businesses (Salvador et al., 2020). Under this model, the production and consumption goes as follows: First, firms extract natural resources; then, they convert them into finished products by using energy; later, they sell it to end users, and end users simply get rid of the products when the products reach the end of their life or are no longer useful for the users (Ellen MacArthur Foundation, 2013).

A linear economy understanding ignores the limited nature of natural resources and, therefore, it challenges sustainability (Frosch & Gallopoulos, 1989). Indeed, a linear approach to production and consumption leads to the disruption of ecosystems (Gedik, 2020). The linear model will no longer be helpful in meeting the needs of mankind, as the limits of the earth are pushed too much in terms of the exploitation of its resources (Sariatli, 2017; European Investment Bank, 2020). There is a global need to change consumption patterns and consume less resources through actions like moving to smaller houses, lowering down the consumption of disposable goods, and reducing car and plane usage (Veleva, 2021). In other words, an antithesis of linear economy understanding is required more and more each day; and this is the circular economy. Given that sustainability is the ultimate goal, circularity is the means to reach this goal (Zucchella & Urban, 2019; Petre, 2020). Not only is it an alternative way of production, but it is also an alternative way of consumption (Reike et al., 2018).

According to the philosophy behind circular economy, man should follow the example of nature in that it acts in a circular manner where everything is an input to another thing (Salvador et al., 2020). In the words of an 18th Century scientist, Antoine Laurent de Lavosier, "Nothing is lost, nothing is created, everything is transformed" (Zucchella & Urban, 2019:4). In that sense, circular economy proposes to replace the flow of *resources-products-waste* in linear economy, with a new flow that is more in line with overall functioning of nature and goes as *resources-products-waste-renewable resources* (Urbinati et al., 2017). With respect to that, circular economy represents a paradigm shift (Gedik, 2020; Rok & Kulik, 2021) and a move stemming from the overall need for an ecological economy (Lahti et al., 2018). The words of Euan Sutherland, CEO of Kingfisher U.K. & Ireland, provide good example of this -seemingly inevitable- paradigm shift (Ellen MacArthur Foundation, 2013:4):

> *"The time is coming when it will no longer make economic sense for 'business as usual' and the circular economy will thrive. Our thinking is in its infancy but we're taking steps now to see what works in practice and to understand the implications of reworking our business model. We are preparing to lead this change by rethinking the way we do business because the reality is, it isn't a choice anymore".*

According to the concept of *mottainai* in Japan, letting something go to waste without making full use of its potential is something to be ashamed of; yet, it happens quite often in a linear economy (UNIDO, 2017). Circular economy, on the other hand, helps societies avoid this. Indeed, at the macro level, a circular approach to economy is expected to lead to savings due to less usage of materials, reduced dependency on resource markets and decreased supply risks, increased innovative activities which potentially can also create new employment opportunities and, finally, an increase in the resilience of the overall economy (Ellen MacArthur Foundation, 2013). The products and services that are designed in line with the circular

approach to economy may be beneficiary to companies and their consumers as well. Indeed, consumers can enjoy products that are designed to last longer, decreasing their cost of ownership. This may also lead to an ease for the companies in managing their product mix, which is supposed to become simpler after the pressure of shorter product life cycles is relieved. In addition, under a circular economy understanding, companies can also offer more choices in ownership/ use of products, such as contractual options. This, then, means increased convenience for consumers (Ellen MacArthur Foundation, 2013).

In short, circular economy can be seen as a *trillion dollar opportunity* which will have positive impacts on employment and growth (World Economic Forum, 2014). It is estimated that in Europe, transition to a circular economy can lead to the creation of 700.000 jobs by 2030 (Bauwens et al., 2019). Likewise, the cost savings due to using less virgin materials under a circular economy in Europe is expected to reach as high as 600 billion USD per year (Sariatli, 2017). Nevertheless, despite the potential gains of switching to a circular economy, linear economy understanding still has a huge domination at a global level; only 8.6% of the global economy is based on circularity principles, and there has been no improvement in this ratio during the last few years (Circularity Gap Report, 2021).

2.2. Circular Economy and Entrepreneurship: Circular Start-ups

A *start-up* is usually defined based on three criteria: age, innovation and scalability. In that sense, a typical start-up can be seen as a company that is not older than 10 years (or 5, depending on the industry), that has incorporated innovation in terms of its product/ service offering or business model, and that has the aim to grow in terms of its number of employees or markets (Steigertahl & Mauer, 2018). Thinking in terms of circularity, it is possible to use either of the term *circular start-up* (Henry et al., 2020) or *born circular firm* (Zucchella & Urban, 2019) to refer to newly established companies that have circular business models. When it comes to the owners of these firms, it is also possible to speak of *circular entrepreneurs*. They can be defined as individuals who "operate a start-up with a business model containing a circularity approach of slowing, closing or narrowing resource loops through either reduce, reuse, recycle or recover strategies" (Hoogenstrijd, 2019:4).

The concept of circular economy reflects a general understanding and approach towards overall production and consumption patterns within an economy. Therefore, the interlocutor of circular economy principles may be considered as both owners and managers of existing businesses as well as owners of newly established or to-be-established companies, in other words, entrepreneurs (Henry et al., 2020). Indeed, when it comes to applying sustainable business models, both existing companies and start-ups are valuable for an economy since they have complementary skills. The parallel efforts of both kinds are valuable for the transformation of a linear economy to a circular one (Hockerts & Wüstenhagen, 2010).

As a matter of fact, the transformation attempts of a linear economy to a circular one may present opportunities for entrepreneurs since pressures towards sustainability may lead to market failures, opening up a space for newcomers (Hall et al., 2010; Veleva & Bodkin, 2018). There is empirical evidence that start-up companies can exhibit a higher degree of compatibility with circular economy principles (Henry et al., 2020). Indeed, established companies usually prefer to focus on simpler circular strategies, such as recycling, which does not necessitate a

radical shift in their core business models (Bauwens et al., 2019). On the other hand, start-ups, with their novel, innovative and sometimes disruptive actions, can even help change the institutional environment in favour of the circular economy (Närvänen et al., 2021).

Nevertheless, since the dominant economy model is still linear in the world, economic activity – including entrepreneurial activity – has been mostly linear up until today and circular economy has not been taken into much consideration by traditional entrepreneurs (Millette et al., 2020). In order to increase circular entrepreneurial activities, there are certain economic and society related barriers that should be overcome. Millette et al. (2020:3) describe these barriers as "lack of scientific and technological knowledge, and of government and community environmental awareness". One other important barrier that circular start-ups might face is the difficulty of accessing funds (Bark et al., 2017; Veleva, 2021; Petre, 2020). Also, lack of supportive regulations (Petre, 2020) and high costs of taking products back or waste processing may be mentioned (Veleva & Bodkin, 2018).

Furthermore, there are other general barriers on the way to going circular both for existing businesses and start-ups. For instance, one important barrier may come from the consumers' willingness to buy products that are produced in line with circularity principles especially when they are manufactured with recycled materials or are of second-hand nature. Indeed, Pretner et al. (2021) have found that perceived value of the aforementioned kind of products decrease in the eyes of consumers. To confirm their finding, lack of consumer interest and awareness is also mentioned as the number one barrier by Kircherr et al. (2018) and Veleva & Bodkin (2018). However, potential difficulties related with running circular businesses are not limited to consumer-based concerns. According to Kircherr et al. (2018:268), there are also cultural barriers, such as "hesitant company culture", "operating in a linear system" and "limited willingness to collaborate in the value chain" as well as market related barriers such as "low virgin material prices", "high upfront investment costs", "limited funding for circular business models" along with regulatory and technological barriers that need to be taken into account.

Despite the difficulties and barriers on the way of going circular, it is still possible to speak of circular start-ups although their number is limited (Bark et al., 2017). They are spread out to different parts of the world and although it is easier to come across circular start-ups in Western Europe, there are circular start-ups in developing countries of Africa and Asia (Zucchella & Urban, 2019). According to research, personal sensitivities of the founders of these firms on issues like the preservation of nature, protection of climate and reduction of waste help determine the development of circular start-ups (Rok & Kulik, 2021). In other words, circular entrepreneurs are motivated by creating an impact and aim to set up a business that will have a positive contribution to the society, but they also focus on financial results, and thus try to achieve a balance in between the two (Hoogenstrijd, 2019; Zucchella & Urban, 2019).

2.3. Circular Economy Strategies and Related Frameworks

Circular economy has been associated with the so-called *R Frameworks* starting from 3R and 4R at its simplest versions and reaching 9R at the highest level (Kircherr et al., 2017; Reike et al., 2018). These frameworks simply provide strategic choice alternatives that can be used when trying to get aligned with circular economy principles. For instance, 3R framework refers to applying *reduce-reuse-recycle* formula in production of goods and services. 3R is a

prominent and commonly used framework that circular economy is based on (Gedik, 2020; Heshmati, 2015).

Under the 3R framework, *reducing* refers to applying a strategy where a product is started to be produced with using less virgin materials, or product usage is intensified through practices like sharing (Bauwens et al., 2019). Hence, it is about efficient production and usage of a product. When it comes to *reusing*, as the name clearly communicates, it is about extending the usable life of a product through all possible means like effective maintenance, repairing when necessary, exchanging products in second hand markets etc. So, it is about the reusage of a discarded but still functional product by another consumer after the product's previous user or users (Kirchherr et al., 2017). Finally, the strategy of *recycling* is also self-explanatory and it refers to processing used materials further to obtain usable materials of either higher or lower quality – the former known as upcycling and the latter known as downcycling (Bauwens et al., 2019). Note, however, that although 3R usually refers to *reduce- reuse- recycle,* as discussed above, sometimes it may also stand for *reuse-remanufacture-recycle* or *reuse-recycle-return* etc (Reike et al., 2018). Indeed, for instance, whereas the general *reduce-reuse-recycle* formula reflects the approach of UN and OECD to the issue, the EU definition of 3R goes like *reuse-recycle-recover* (Reike et al., 2018:252).

When it comes to 4R, it refers to the addition of a further R to the reduce- reuse- recycle formula, which is *recover*. Here, recovering refers to processing waste materials (incineration) in a way to reach – and hence, recover - the still unused energy embodied in them (Henry et al., 2020). Though 4R may be slightly less popular than 3R, it is the official circular economy policy framework of the European Union (Kircherr et al., 2017). Finally, it is possible to add *refuse*, *rethink*, *repair*, *refurbish*, *remanufacture* and *repurpose* strategies to create more complicated frameworks (Potting et al., 2017). Actually, no matter which framework is taken, they may all be seen as tools that can be used for operationalization of sustainable development for businesses (Kircherr et al., 2017).

2.4. Circular Business Models

To put it simply, a business model describes "how a firm does business" (Richardson, 2008:136). If a slightly more complicated definition is to be made, Osterwalder & Pigneur (2010:14) define a business model as a concept describing "the rationale of how an organization creates, delivers and captures value". Though there are a number of different definitions of a business model, this one reflects the general understanding behind a business model concept upon which most people agree (Lahti et al., 2018). When it comes to conceptualization, there are a number of different models developed by researchers. As a matter of fact, with referring to the original work of Morris et al. (2002), Richardson (2008) mentions about the existence of ten different frameworks with a number of components ranging from three to eight and all developed in the beginning of the 2000's. Developed later on, hence not mentioned by Richardson (2008), one framework that is definitely worth mentioning is the well-known *Business Model Canvas* of Osterwalder & Pigneur (2010).

A more compact business model conceptualisation by Bocken et al. (2014) based on the works of Osterwalder & Pigneur (2005) and Richardson (2008) makes it obvious that, in essence, a business model covers three basic dimensions: 1) "Value proposition", 2) "Value creation and delivery" and 3) "Value capture". Here, value proposition simply is about the

product and service range of the company and its customers, whereas value creation refers to all kind of activities and resources that are to be carried out (under which key resources, activities and partnerships of the Canvas model are included). Finally, value capture refers to the cost and revenue related issues mentioned in Canvas. When it comes to using these conceptualisations in studying business models that are formed in line with circularity principles, Canvas is a highly utilized tool (Urbinati et al., 2017; Zucchella & Urban, 2019). As a matter of fact, Daou et al. (2020) have even created the Ecocanvas as a circular version of it by adding three more dimensions to the model, which are economic/ legal, social and environmental forces. Like Canvas, the three-dimensional compact visualisation of Bocken et al. (2014) is used by many researchers as well (Whalen, 2019; Gillabel et al., 2021; Veleva, 2021).

The principles behind circular economy can affect the way companies make business and lead to the transition of existing business models or appearance of new ones (Urbinati et al., 2020). Such business models which are in line with circularity principles, or simply put as *circular business models*, can be defined as follows: (Lahti et al., 2018:3)

> *"A circular business model is designed to create and capture value while helping achieve an ideal state of resource usage (e.g., finding a model that most closely resembles nature and comes close to achieving the complete cycling of materials). Accordingly, the goal of the business model shifts from making profits through the sale of products or artefacts to making profits through the flow of resources, materials, and products over time, including reusing goods and recycling resources".*

In essence, circular business models serve the aim of protecting the resource base of society "by slowing and closing resource flows" (Whalen, 2019:11). They can be considered as, so-to-say, a member of the sustainable business models family (Bocken et al., 2014). Though somewhat limited in number, there are different circular business model typologies in the literature that have been developed in recent years (Urbinati et al., 2020; Pieroni et al., 2020).

One of the first typologies in the literature belongs to Bocken et al. (2016:313) who classify business model strategies in line with circularity principles under six categories: "Access and Performance Model", "Extending Product Value", "Classic Long Life Model", Encourage Sufficiency", "Extending Resource Value" and "Industrial Symbiosis". A somewhat similar, yet, more recent typology was also proposed by OECD (2019). Five different circular business model archetypes are listed as "Circular Supply Models", "Resource Recovery Models", "Product Life Extension", "Sharing Models" and "Product Service Systems (PSS)". The five models proposed by OECD (2019) can be considered as involving a popular list of overarching archetypes that are mentioned by various other institutions and researchers as well (Pollard et al., 2021).

Based on their literature review of several more archetypes, Pieroni et al. (2020) undersigned a comprehensive consolidation where a total of 20 archetypes are listed. The archetypes that Pieroni et al. (2020) mention are either of downstream or upstream nature. In that sense, they either focus on the product / service itself and the customer (downstream) or are about the sourcing, production and distribution related operations of the company (upstream). Classifying different business models with such an approach is parallel to the theoretical framework that was developed by Urbinati et al. (2017) in which companies are classified as either downstream, upstream or full circular (both upstream and downstream) depending on the level of their adoption of circularity principles.

3. Methodology

The research is composed of four consecutive steps as explained in the following sections.

3.1. Step 1: Creating a Sample of Circular Start-ups in Turkey

The first step aimed to generate a list of circular start-ups in Turkey. With that purpose, a desk research was carried out in order to create a list of circular start-ups in Turkey. During this first step, basically the following sources were used: Websites of business incubators in Turkey, websites of related sectoral organisations and relevant press articles and documentaries on circular start-ups.

As far as websites of business incubators are considered, the study focused on 16 different business incubators (see Appendix). During this first step, the lists of their tenant firms (start-up companies that use/ have used the services of these incubators) were reviewed carefully to see whether they may include any start-ups that might be considered as circular. With that regard, a total of 1.188 start-ups were reviewed.

In addition to business incubators, sectoral organizations were also considered as potential information sources that may lead to circular start-ups. Therefore, the websites and online publications of SKD Turkey, Turkey Circular Economy Platform and TUSIAD were checked as well. Also, news and press articles on entrepreneurship/ start-ups and documentaries were also scanned to find clues that may lead to particular circular start-ups.

Regardless of the source of information, the companies identified in this step were evaluated according to the following eligibility criteria:

- Whether they were younger than 10 years – hence established later than 2012
- Whether they were commercially active as of 2022 – hence leaving start-ups that might have been circular in nature but gone bankrupt or those which were in the earlier stages of their life cycle
- Whether their business model incorporated at least one of the circularity (R) strategies

As a result, a total of 47 circular start-ups were identified in this step (see Appendix).

3.2. Step 2: Gathering up Data About the Companies in the Sample

After generation of the *circular start-ups list* in the first step, publicly available information was collected on each company using their websites. In this step, the information made available by these companies was evaluated with regard to their area of operation/ business model, and, their references to circular economy or related concepts.

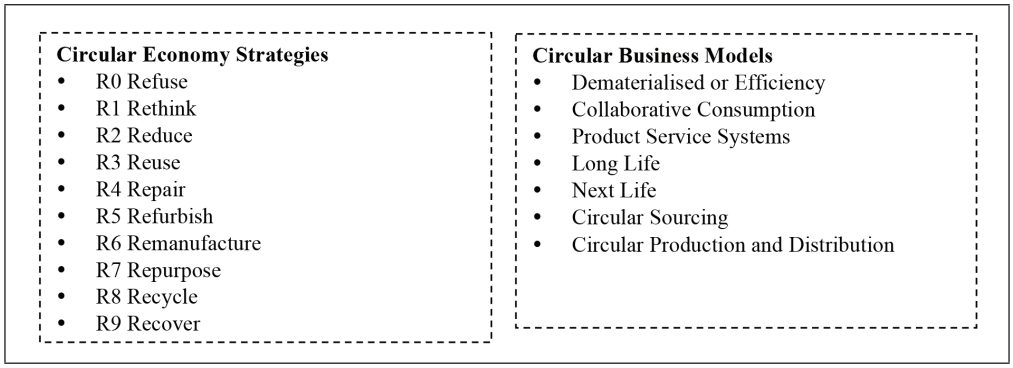
While collecting information on their area of operation and business model, declarations of the companies about their products or services, mission and vision, customer value proposition, service terms – and the like – were taken into account. Such descriptive statements were recorded to the database *mot-a-mot* as extracts to be analysed in detail in Step 3.

In addition to collecting evidence regarding the business models of those companies, available information in their websites were also reviewed to see whether there was physical evidence of an awareness regarding circular economy. In that sense, the websites were checked to see whether the companies directly refer to circular economy (such as sharing general information about circularity principles, or - for the better- identifying themselves as being circular), and whether they make any reference to circularity related issues like, sustainability, environment, climate change, clean energy, waste reduction etc.

3.3. Step 3: Coding Based on Theoretical Framework

In order to come up with an answer to the research questions, the data collected in the previous step was subjected to content analysis. With that purpose, a coding framework was developed based on the literature review. The coding framework included the most comprehensive and recent approaches on circularity strategies and circular business models, to the best knowledge of the authors. In line with this goal, the framework mentioned by Potting et al. (2017) was selected by the authors for coding circularity strategies in use, whereas the archetypes mentioned by Pieroni et al. (2020) were selected for coding circular business models.

Figure 1: Theoretical Framework Used in Coding



Source: Developed by the researchers, based on Potting et al. (2017) and Pieroni et al. (2020)

Once the theoretical framework was decided upon, information collected in the previous step was manually coded. In order to increase the validity and reliability of the process, coding was done in two steps. First, it was done separately (working on an individual basis). In the second step, this time working as a team, they compared their coding with one other to identify any difference. After discussing the differences in coding, the process was finalised once they reached a consensus.

3.4. Step 4: Frequency Analysis of Codes and Developing a Typology

In the fourth and final step, a frequency analysis was carried out in order to find which circularity strategies and circular business models were preferred more by circular start-ups in Turkey. Later, the relationships between circularity strategies and circular business models

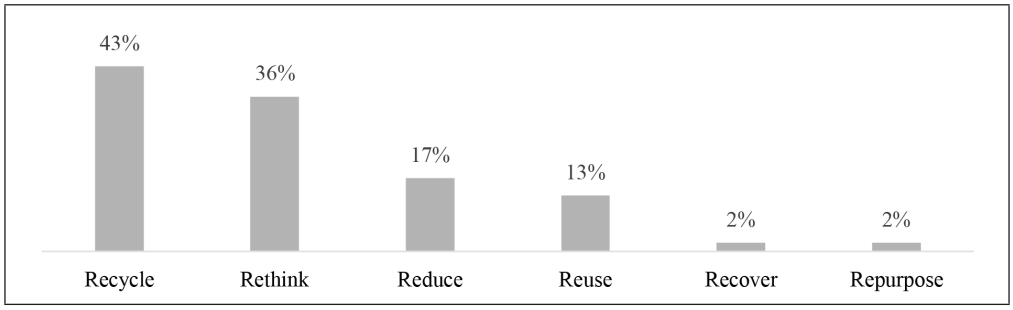
were analysed by checking whether certain strategies were coupled more with certain business models. In other words, they checked whether there were some *popular strategy and business model combinations* which may lead to a typology.

4. Research Findings

4.1. Adaptation of Circular Economy Strategies by Turkish Circular Start-ups

According to the result of the data analysis as shown in Figure 2, the most frequently used circularity strategy by circular start-ups in Turkey is *Recycling*, which is adopted by almost half (43%) of the companies in the sample. It is followed by *Rethinking*, which is being used by one thirds (36%) of the companies in the sample. These are followed by reduce and reuse strategies. It was observed that recover and repurpose strategies are not common among Turkish circular start-ups.

Figure 2: Adaptation Rates of Circular Economy Strategies by Circular Start-ups in Turkey



4.2. Circular Business Models Used by Turkish Circular Start-ups

According to analysis of the data based on the circular economy business models framework proposed by Pieroni et al. (2020), the most frequently used business model used by Turkish circular start-ups is *Next Life- Extending Resource Value* (30%) as shown in Figure 3. It is followed by *Collaborative Consumption- Sharing Platform* (23%) and *Circular Sourcing- Circular Supplies* (21% business models. Finally, it was observed that *Products Service System (PSS)- Access Model* and *Next Life- Direct Reuse* are also adopted by Turkish circular start-ups although not as much as the first three.

Figure 3: Circular Business Models Used by Circular Start-ups in Turkey

4.3. Categorization and Detailed Description of Circular Economy Start-ups in Turkey

Based on the analysis of the data, we can suggest that circular start-ups in Turkey can be categorised mainly under five categories: 1) Recycling Companies, 2) Sharing Based Endeavours, 3) Recycled Material Users, 4) Second-Hand Product Marketplaces, and 5) Waste Management Platforms. As can be seen in Table 1 below, two categories, namely recycling companies and sharing-based endeavours, constitute almost two thirds of circular start-ups in Turkey.

Table 1: Categorization of Circular Economy Start-ups in Turkey: Category Sizes

Category of Circular Start-up	Number of Companies	%
1) Recycling Companies	14	30
2) Sharing-Based Endeavours	13	28
3) Recycled Material Users	6	13
4) Second-Hand Product Markets	6	13
5) Waste Management Platforms	4	9
Others (Unclassified)	4	9
Total	47	100

This categorization was done by taking into account the following factors: Basic definition of the business, type of the business (B2C, B2B, C2C), dominant circularity strategy adopted and circular business model. A summary of the categorization criteria used and brief category definitions is provided in Table 2. Each of these categories are described in the rest of this section.

Table 2: Categorization of Circular Economy Start-ups in Turkey: Categorization Criteria and Definitions

Category of Circular Start-up		Business Definition	Type of Business	Dominant Circular Strategy	Circular Business Model
1) Recycling Companies	Type A (Recyclers)	Production of material Y - as an input for another company-via recycling material X	B2B	Recycle	Next Life – Extending Resource Value
	Type B (Supporters)	Production of goods or services that are used to improve the process of recycling	B2B	Recycle	Next Life – Extending Resource Value
2) Sharing-Based Endeavours	Type K	Temporary rental of goods (that are owned by a company) to customers	B2C, B2B	Rethink	Product Service System – Access Model
	Type L	Temporary rental of goods among consumers themselves	C2C	Rethink	Collaborative Consumption – Sharing Platform
	Type M	Sharing resources among consumers themselves	C2C	Rethink & Reduce	Collaborative Consumption – Sharing Platform
3) Recycled Material Users		Production of goods that are made of recycled materials	B2C, B2B	Recycle	Circular Sourcing – Circular Supplies
4) Second-Hand Product Marketplaces		Sale of goods among consumers themselves	C2C	Reuse	Next Life – Direct Reuse
5) Waste Management Platforms		Informational platforms or marketplace applications that aim to improve utilization of materials (which would otherwise turn into obsolete)	B2B, B2C	Rethink	Collaborative Consumption – Sharing Platform

4.3.1. Recycling Companies

Among all circular start-ups, recycling companies constitute the biggest proportion. These companies can further be classified as *Type A* and *Type B* depending on the definition of their business. *Type A* recycling companies are those that recycle a material which can later be used as an input by another company. In other words, they are directly *recyclers* themselves.

As a matter of fact, there are 10 such companies in the sample (21% of the sample). More than half of them (6 out of 10) are located in Istanbul – as might be expected- since Istanbul can be considered as the economical capital of the county. However, the rest of them are spread to different provinces such as Rize, Yalova, Eskişehir and Bursa. These companies recy-

cle quite different kinds of materials and produce mostly biobased plastics and other materials that can be used by other companies as input in their production processes. Table 3 provides information on the inputs and respective outputs of these companies.

Table 3: Inputs and Outputs of Type A Recycling Companies

Input (Waste Material to be Recycled)	Output
Coffee	Biobased plastics
Rubber	Carbon black, liquid hydrocarbons, devulcanized rubber
Olive and other bio-based materials	Biobased leather alternative
Inert tea fibers	Biocomposite raw materials
Animal based tissues	Collagen solutions
Carpets	Biobased plastics
Vehicle tyres	Energy and raw materials (s.a. carbon black)
Olive seeds	Biobased plastics and granules
Bread	Biobased plastics
Water and flue gas	Biodiesel

In addition to Type A (recycler) companies, there are also a smaller group of companies that can be classified as *Type B* companies, which are under the category of recycling companies. This latter group of companies is not involved in the recycling processes directly. However, these companies act as *supporters* of recyclers. *Type B* companies provide goods and services to recyclers to be used in their recycling operations. The products / services that are provided by *Type B* companies include hardware and software solutions that increase efficiency in recycling processes, biological enzymes that are used during recycling or special machines that enable companies to recycle some of the materials that they use. Needless to say, the basic circularity strategy adopted by either Type A and Type B companies is *recycling* and their business model fits the *next-life: extending resource value* typology (Pieroni et al., 2020).

4.3.2. Sharing-Based Endeavours

Sharing-based endeavours can be further divided into three subcategories: Type K, L and M. Unlike recycling companies, sharing-based endeavours have almost no geographical spread and they are all located in Istanbul except one. The first subcategory under sharing based endeavours, Type K, is composed of businesses where a company rents its goods of different nature to consumers or other businesses. In that sense, Type K companies operate either on B2C or B2B basis. Type K companies constitute 13% of the sample. As far as the B2C businesses of this type are considered, we found that these are the companies that provide urban mobility solutions (such as electrical scooters and bikes) or clothes and accessories to women. On the B2B side, there is only one start-up to mention and it leases textiles to hotels.

Type L start-ups are similar to Type K ones in that consumers rent goods or assets for a temporary -and usually short- period; but, the difference is that this time, it is consumers themselves who rent these goods to other consumers (hence a C2C model). This kind of start-

ups refer to 9% of the sample and the goods or assets that are rented among consumers include small goods such as furniture and clothes to bigger assets like caravans or houses.

The last subcategory, Type M endeavours, include start-ups that enable individuals help other individuals meet their needs. The difference, however, is that individuals do not rent anything to others – in other words, it is not a temporary exchange of ownership arrangement between people. Instead, in Type M start-ups, individuals simply *share* their resources with each other. Type M start-ups constitute only a small portion (6%) of the overall sample. Example start-ups include platforms under which people can find others which can handle transportation of goods for them. For instance, with the help of such platforms, an individual who wants to deliver a luggage from, say, Istanbul to Ankara, can find if there is anyone who will travel with his car in the same destination and can handle the delivery.

In all sharing-based start-ups mentioned above, the dominant circular strategy is *rethinking*, which refers to "making use of a product more intensively (e.g. by sharing the product)" (Kircherr, 2017:224). As far as the circular business model in use is of concern, Type K start-ups act in line with *product service systems- access model* under which customer value is generated by letting individuals gain access to a certain product or service for some period rather than own it (Pieroni et al., 2020). Type L and M start-ups, however, seem to operate more in line with *collaborative consumption – sharing or pooling platform* model since under this model, products, services, assets owned by individuals or companies are shared with a commercial purpose (fee etc) (Pieroni et al., 2020).

4.3.3. Recycled Material Users

The third category of circular start-ups in Turkey is made up of businesses which have a business model based on using recycled materials during production. These companies make up 13% of the sample and use a variety of materials as input to manufacture products of different a nature. Table 4 provides details on the input-output relationships of these companies included in the sample.

Table 4: Inputs and Outputs of Recycled Material User Start-ups

Input (Waste Material to be Recycled)	Output
Fruit/ vegetable waste and bugs	Protein powder
Green waste (fruit peels, barks, leaves etc)	Decorative objects and furniture
Olive waste	Olive powder, leaf and olive-based seasonings
Waste plastics	3D printer filaments
Olive seeds	Faucet aerators
Household food scraps	Bokashi compost

As a matter of fact, recycled material user start-ups somewhat resemble Type A recycling companies in that both use waste materials as input. The difference, however, lies in output. Whereas recycling companies process waste material to produce materials to be further processed by other companies and turned into final products, recycled material user start-ups do this final conversion themselves. Hence, although the dominant circularity strategy is *recy-*

cling in both categories, the business model is different. Indeed, recycled material user start-ups adopt the *circular sourcing – circular supplies* business model under which "value is created by sourcing circular products or materials, e.g., recycled, renewable, waste, or pollution" (Pieroni et al., 2020:8).

4.3.4. Second-Hand Product Marketplaces

Second-hand product marketplaces make up another 13% of the sample and start-ups under this category offer a marketplace for individuals who would like to buy and sell second-hand goods. These start-ups have certain similarities with companies under the sharing-based endeavours category. First, both categories can be thought as being mostly *digital*. Second, both Type L sharing endeavours and second-hand product marketplaces are virtual worlds where individuals gather. Third, start-ups under both categories are concentrated in Istanbul (so that, only one company in each category is located elsewhere). Fourth, as in the case of Type L start-ups, a number of different goods can be the subject of exchange. Indeed, the start-ups in the second-hand product marketplaces category enable the exchange of, for instance, furniture, women's clothes and electronical equipment.

Regarding the scope of goods that can be subject to exchange, out of the six companies classified under this category, three seem to prefer acting as *specialists* in that they provide a marketplace for special items like children/ baby furniture and clothes or women's clothes. The remaining three however, acting more like *generalists*, enable exchanges in a wider sense, without putting much limit on the types of goods to be exchanged.

What differs between Type L sharing-based endeavours and second-hand product marketplaces is the exchange arrangement: Start-ups of Type L enable ownership exchange of goods among individuals on a temporary basis whereas ownership transfer in second-hand product marketplaces is made on a permanent basis. As for the circularity strategy of second-hand product marketplaces, *reuse* fits perfectly well since it refers to "reuse by another consumer of a discarded product which is still in good condition and fulfils its original function" (Kircherr, 2017:224). Their circular business model fits the *next life – direct reuse* typology (Pieroni et al., 2020).

4.3.5. Waste Management Platforms

The final category of circular start-ups in Turkey is that of waste management platforms which makes up 9% of the sample. Like sharing-based endeavours and second-hand product marketplaces, these platforms can be thought as *digital* businesses that have been established -all- in Istanbul. Waste management platforms concentrate mostly on food and try to eliminate waste in line with the *mottainai* understanding of Japan, explained earlier in this paper. In that regard, these platforms are based on providing information exchange among parties that can lead to better utilization of resources. To give an example, a market chain who has some food with very close expiration dates is able to send these to food banks or consumers looking for cheap food with the help of these platforms.

These platforms have common points with sharing-based endeavours in that both use *rethinking* as the dominant circularity strategy and the business model of *collaborative consumption – sharing or pooling platform* seems to apply. In that sense, they might be classified

under the already existing category of sharing-based endeavours. Yet, the *vision/ philosophy* behind waste management platforms is thought to be distinctive enough to trait related start-ups under a different category.

5. Conclusion

This research aimed to take a snapshot of circular start-ups in Turkey, starting from spotting them one by one, and then carrying out an analysis that provides information on the circularity strategies and circular business models that are used by those companies. In addition, this research also aimed to suggest a typology that helps understand Turkish circular start-ups better – if possible. With these goals in mind, data on circular start-ups was gathered from a sample of 47 companies. Later, their circularity strategies and business models were analysed using comprehensive and recent frameworks available. After that, a typology suggestion was made that could explain over 90% of the companies in the sample.

According to the typology suggestion based on the research outcomes; circular start-ups in Turkey can be grouped under 5 categories:

1) Recycling Companies: Start-ups who produce or support the production of materials for other companies via recycling processes
2) Sharing-Based Endeavours: Start-ups that either rent goods to individuals themselves or help individuals rent or share their goods and resources with other individuals
3) Recycled Material Users: Start-ups that manufacture end-products for individuals using recycled materials
4) Second-Hand Product Marketplaces: Start-ups that provide marketplace applications to individuals where they can buy and sell used goods
5) Waste Management Platforms: Start-ups that provide platforms to companies or individuals enabling them to sell/buy goods or products that are either idle or soon to-be-wasted

The research contributes to the literature on the interaction between circular economy and entrepreneurial activities where more studies are needed in general (Henry et al., 2020). Probably more important than that, it provides insights and solid examples on this topic in the context of a developing country, Turkey. In this vein, given that the literature on circular economy is still developing in Turkey, the contribution of the research to the literature in the local context is even more evident. Since there is no preceding study in the country – to the knowledge of the authors-, the study has been a pioneering one. In addition, because there is no database or association that covers circular start-ups together, even the formation of the database itself is believed to be valuable as it may be useful as a starting point in the studies to follow.

As far as the findings of the research are considered, the observation that recycling is the most popular circularity strategy among Turkish circular start-ups might be *partially* in line with the findings of Henry et al. (2020) who conducted a similar and inspiring study with circular start-ups located in selected industrial regions of Western Europe (Amsterdam, Berlin,

London). Different from the case of Turkish start-ups, however, Henry et al. (2020) observed that *reducing* strategy was leaving recycling strategy behind in terms of utilization by Western European start-ups. In other words, although recycling was among the popular circularity strategies, it was not as dominant as it is in Turkey. This situation can be explained with the fact that Turkey is relatively at an earlier phase in the transformation from a linear economy to a circular one compared to western countries. Indeed, conceptually speaking, recycling strategy is closer to linear economy understanding than is reducing strategy (Potting et al., 2017). Thus, it should not be surprising to add that in another research made again in a developing country context, Hull et al. (2021) mention that stakeholders of circular start-ups refer to recycling strategies more than circularity strategies of more advanced nature.

One other finding of the research that needs to be specifically addressed is that the second biggest group of circular start-ups in Turkey is classified under *sharing economy*. Although sharing platforms constitute one of the forthcoming clusters of circular start-ups in the study of Henry et al. (2020) as well, their ratio among all circular start-ups turned out to be below the respective ratio observed in Turkey. Yet, this can be understandable since Turkey is shown among the countries where sharing economy has a strong growth trend and a considerable potential (Oflaz, 2019). In line with this, recent research shows that Turkish people have a positive attitude towards sharing economy especially when buying and selling of unused or underutilized goods are considered and Turkish people see sharing as a way of saving money and avoiding wastage (Özdoğan & Özkul, 2020). Turkish culture, which is collectivist in nature, may have a facilitating role in the demand towards sharing-based services.

Although somewhat indirectly, the research has also shed light on the contributions of business incubators to the economy. Indeed, a great majority (to be exact, 70%) of circular start-ups that were included in the sample are known to use/ have used the services of business incubators in Turkey. The contribution of incubators to circular economy through supporting related start-ups is in line with the words of Millette et al. (2020) who suggest that business incubators may be a useful tool for circular economy. As a matter of fact, Millette et al. (2020) go further and discuss the development of a so-called *circular economy incubator*. For the time being, such a concept is in its infantry stage (Hull et al., 2021). Therefore, it is hard to come across incubators that specifically focus on supporting circular start-ups and the case of Turkey is no exception. Nevertheless, it is believed that the establishment of circular economy incubators in the future may be helpful in accelerating circular economy related activities in Turkey. All in all, incubators provide a social setting that allows interactions -hence creating synergy- among entrepreneurs, and interactions with different stakeholders are observed to be an important building block in the creation of circular business models (Mehrotra & Jaladi, 2022).

One further point worth underlining is that during the fieldwork of the study, the majority of the circular start-ups were observed to undertake communication efforts that might help increase public awareness towards circular economy or related concepts such as environmental sustainability. Several public messages about subjects like carbon emission, zero waste, food waste, minimizing consumption, climate change, sustainable development, energy saving, consumption of natural resources, energy efficiency and recycling were observed in the corporate websites of the companies included in the sample. Some of the circular start-ups were even observed to go further and directly refer to the concept of *circularity* when explaining their

operations. It is believed that such efforts will contribute to awareness increase regarding circular economy among Turkish people. Previous research on circular start-ups in emerging economies show that communication efforts on circularity is valuable and necessary for the transition towards a circular economy (Mehrotra & Jaladi, 2022). Indeed, the activities of circular start-ups are empirically observed to have a positive impact on other actors in the environment and help the institutionalisation of circular economy-friendly practices (Närvänen et al., 2021).

Being an exploratory study, the research has several limitations. To begin with, we cannot claim that the sample was representative of the universe. This has several reasons. First, there is no dataset or reference point (such as an association) that can be used to clarify the universe of circular start-ups at a given time. In that sense, the size and context of the universe is totally unknown. Secondly and parallel with this, the sample was constructed on a convenience basis. In addition, although mixed sources were used while constructing the sample, business incubators were a major and useful source. It is impossible to know whether this factor created some kind of bias in the sample.

Another limitation of the research lies in the data collection tool. As explained in the methodology section, the data on the companies included in the sample was based on the websites of these companies. Although in this research websites act as a primary source of data and can be considered as sufficient in terms of data availability and relevancy given the research questions, data collection was not an interactive process – as would be in the case of a face to face interview. In that sense, we assumed that the data provided in the websites of these companies was correct and up to date.

Given that the research is an exploratory and pioneering one in its field, the opportunities for additional studies on circular start-ups in Turkey are thought to be many. Seeing this as a study providing some light on an otherwise-dark terrain, researchers are encouraged to start digging circular start-ups and look for the answers to additional and more specific questions by using additional data collection techniques. In that sense, it might be useful to look for answers to questions like:

- What is the total contribution of the circular start-ups to Turkish economy in terms of total value added, additional jobs created, contribution to balance of payments via export operations etc?
- How profitable are these companies when compared to their non-circular rivals? What does acting circular bring to or take from a start-up in financial terms?
- What does being circular add to these companies in the eyes of their clients – if any? Does being circular on the company side bring a change in (perceived) customer value ?
- Which globally available circular business ideas and models have not been introduced in Turkey yet and in which areas lie the opportunities for the establishment of new circular start-ups? etc..

Conflict of Interest

There is no conflict of interest regarding this paper.

Contribution Statement

Equal contribution has been made by the authors during the preparation of this paper.

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Appendix

A1. List of Business Incubators Used As a Resource for Generating the Sample

Name of Business Incubator	Website
Acıbadem Üniversitesi Kuluçka Merkezi	https://www.acibademkulucka.com/#girisimler
Albaraka Garaj Start-up Hızlandırma Merkezi	https://www.albarakagaraj.com/girisimlerimiz
Arınkom Teknoloji Transfer Ofisi	https://arinkom.anadolu.edu.tr/girisimcilik/start-uplarimiz
Bilgiyi Ticarileştirme Merkezi (BTM)	https://btm.istanbul/girisimler
Cube Incubation	https://www.cubeincubation.com/girisimlerimiz
Garanti BBVA Partners	https://www.garantibbvapartners.com/
Girişim Fabrikası	https://girisimfabrikasi.com/girisimler
ITU Çekirdek Kuluçka Merkezi	https://itucekirdek.com/girisimciler/
Kworks Koç Üniversitesi Girişim. Arş.Mrk.	https://kworks.ku.edu.tr/girisimler/
Minerva Kuluçka Merkezi	https://minerva.yasar.edu.tr/kategori/guncel-girisimlerimiz/
Nuvege	https://www.nuvege.org/girisimler
TEB-TİM Girişim Evi	https://timlegirisim.com/tr/girisimler.html
TOBB ETU Garaj	https://etugaraj.org/girisimciler/
Türk Telekom Pilot	https://turktelekompilot.com.tr/girisimler
Ulukoza Kuluçka Merkezi	http://www.ulukoza.com/kazanan-girisimlerimiz/
Workup Girişimcilik Programı	https://workup.ist/girisimler

A2. List of Circular Start-ups Included in the Sample (n=47)

No	Name of Company	Location	No	Name of Company	Location
1	Algae Biodizel	İstanbul	26	Missafir	İstanbul
2	Anadolive	İzmir	27	Modacruz	İstanbul
3	Atık Nakit	İstanbul	28	Modaloop	İstanbul
4	B2N (Back to Nature)	İstanbul	29	Mum.o Wrap	Muğla
5	Barty	İstanbul	30	Naturansa	Kocaeli*
6	Biftek.co	Ankara*	31	Oleatex	İstanbul
7	Biolive	İstanbul	32	Oreka	İstanbul
8	B-Preg	İzmir	33	Ottan Stüdyo	İstanbul
9	Bugamed	Eskişehir	34	Plastic Move	İstanbul
10	Car4Future	İzmir	35	Recool	Bursa
11	Carryvibe	İstanbul	36	Rentony	İstanbul
12	Cleantex	İstanbul	37	Rtex	İstanbul
13	Compose-it	İstanbul	38	SelfCargo	İstanbul
14	Dekopasaj	İstanbul	39	Sindirella	İstanbul
15	Delifer Enerji	İstanbul	40	Tazekese	İstanbul
16	Evreka	Ankara	41	Tutumlu Anne	Kocaeli
17	Fazla Gıda	İstanbul	42	Unibike	İstanbul
18	Filamex	İstanbul	43	Unomoi	İstanbul
19	Gardrops	İstanbul	44	Vanswap	İstanbul
20	Geneon	İstanbul	45	Varsapp	İstanbul
21	Hagelson	İstanbul	46	Wastespresso	İstanbul
22	Icarbon	Bursa	47	Zebramo	İstanbul
23	Komporize	Rize			
24	Laska	İstanbul			
25	Martı	İstanbul			

* Location of initial foundation; Later on moved to USA