ACADEMIC REVIEW OF HUMANITIES AND SOCIAL SCIENCES
Vol.: 4 Issue: 1 Year: 2021, pp. 18-32

ARHUSS
ISSN: 2636-7645

CIRCULAR ECONOMY PRACTICES IN TURKEY AND THEIR POTENTIAL INTERACTION WITH CLIMATE CHANGE MITIGATION AND ADAPTATION

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Received Date (Başvuru Tarihi): 21/03/2021
Accepted Date (Kabul Tarihi): 05/05/2021
Published Date (Yayın Tarihi): 20/06/2021

ABSTRACT

Circular economy is the wise use of all resources, especially natural resources, while increasing efficiency as well as reducing waste. As the circular economy serves the requirements of corporate social responsibility, it has become a prevalent approach in recent years and has begun to be included in the strategies and statements of corporations. However, while being clearly expressed as a concept, when it comes to actual implementation, circular economy practices cannot be listed down in a comprehensive way and corporations are usually faced with uncertainty in this regard. In line with its global development, corporations in Turkey have started to utter the word more frequently. This study looks into that already existing circular economy methods in Turkey and discusses their potential impact. These are namely, organized industrial zones, industrial zones and others as clusters, free trade zones, Techno Parks and industrial symbiosis examples. Furthermore, the afore listed tools of circular economy are discussed based on their potential in respect to near future sector-based implications of increasing focus on climate change.

Keywords

Corporate Social Responsibility, Circular Economy, Climate Change

TÜRKİYE'DEKİ DÖNGÜSEL EKONOMİ UYGULAMALARI VE İKLİM DEĞİŞİKLİĞİ ÖNLEME VE UYUMU İLE POTANSİYEL ETKİLEŞİMLERİ

ÖZ

Döngüsel ekonomi, tüm kaynakların, özellikle de doğal kaynakların akıllıca kullanılmasıdır, aynı zamanda verimliliği artırmanın yanı sıra atıkları da azaltır. Döngüsel ekonomi, kurumsal sosyal sorumluluğun gereklerine hizmet ettiğinden, son yıllarda yaygın bir yaklaşım haline geldi ve firmaların strateji ve beyanlarında yer almaya başladı. Ancak, bir kavram olarak açıkça ifade edilirken, fiili uygulama söz konusu olduğunda, döngüsel ekonomi uygulamaları kapsamlı bir şekilde sıralanamaz ve firmalar bu konuda genellikle belirsizlikle karşı karşıya kalırlar. Küresel gelişimine paralel olarak Türkiye'deki firmalar kelimeyi daha sık söylemeye başladı. Bu çalışma, Türkiye'de halihazırda mevcut olan bazı döngüsel ekonomi yöntemlerini inceliyor ve bunların potansiyel etkilerini tartışıyor. Bunlar, organize sanayi bölgeleri, sanayi bölgeleri ve kümelenme uygulamaları, serbest ticaret bölgeleri, Tekno Parklar ve endüstriyel simbiyoz örnekleridir. Ayrıca, yukarıda sıralanan döngüsel ekonominin araçları, iklim değişikliğine artan odaklanmanın yakın gelecekteki sektör temelli sonuçlarına ilişkin potansiyellerine dayalı olarak tartışılmaktadır.

Anahtar Kelimeler

Kurumsal Sosyal Sorumluluk, Döngüsel Ekonomi, İklim Değişikliği

Citation: Özuyar, P.(2021), Circular Economy Practices in Turkey and Their Potential Interactıon wıth Climate Change Mitigation and Adaptation, ARHUSS, (2021), 4(1):18-32.

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1. INTRODUCTION

The world's growing population and the economic growth, differentiated consumption patterns have caused differentiation and increase of needed goods and services. As growing population on one hand threatens the economic growth in terms of resources, on the other hand, plays a role in the development of non-industrialized countries. Issues brought about by economic growth, primarily the environmental impact, have come up and investigations have been carried out on the increase in income and environmental quality deterioration. Following Carson (1962) who has reflected the environmental quality deterioration to an extensive circle, a broader comprehension has been introduced as sustainable development and has been briefly defined in World Commission on Environment and Development (WCED) report as 'meeting current needs without compromising the lives of future generations'(WCED, 1987).

This definition incorporates the necessity to keep the social, economic and environmental impact regarding the improvement and development of any institution or country in perfect balance. Although initially the institutions have considered sustainability and the concept of sustainable development solely as a non-institutional activity yet where the institution now and then interferes with in line with its own initiative, Nicholas Stern's (Stern, 2007) opinions which state that the sustainable development in fact overlaps also with the institutions has contributed to spread this approach. Yet the general approach until the aforementioned period can be summarized as 'who contaminates pays' approach. "Who contaminates pays" principle is an implementation which necessitates that the contaminators have to bear the costs of management to avoid harm on public health or environment, gains general recognition and holds the foundation of most of the regulations regarding land, water and air pollution. In 'who contaminates pays' general approach, the factory which produces waste product or which as a result of this waste product potentially causes the emission of toxic or noxious substance is held responsible for its proper and safe disposal. The most important reason why 'who contaminates pays' approach has been renounced in time is because a new approach aimed at avoiding contamination has been developed. Undoubtedly, the intensive studies on resource issues in 1990's and the use of term "recycling" and its further integration to the country's legislations have played an important role on this new comprehension. In 1990's, this development has led to the

developments of 'from cradle to grave' and 'from cradle to cradle' approaches which involve all the activities of business starting from the point of entry to exit including those concerned with recycling, thus, the businesses have passed from getting away with it by solely paying a unit price for the contamination they have left, to aiming to minimize the waste they will cause, by smartly using the yield and the resources for the plant, which later on will be taken away and disposed of by third parties. What is spoken today is the concept of 'natural capital'. Natural Capital is the total global environmental living and non-living reserve that provides all the necessary ecological resources to support life. Natural capital or natural income has a financial value, however, it is difficult to digitize this value and the studies for the recognition of the natural capital continue (Buchmann-Duck & Beazley, 2020; Barros et.al., 2021; De Angelis, 2021).

2. CIRCULAR ECONOMY AND CLIMATE CHANGE

This change in the understanding of environmental impacts of corporations, came hand-in-hand with the re-thinking and re-valuation of the economic thought and the long existing linear economy discourse, reformed into circular economy. Circular economy, in a very brief description, is the wise use of all resources, especially natural resources, while increasing efficiency as well as reducing waste in all forms. In the circular economy model, the life cycle analysis for each natural resource entering begins with the extraction or harvesting of that product and careful examination for all possibilities of resource minimisation, reuse, down-cycling, re-cycling and upcycling during production and use as well as proper resource recovery and disposal once the lifetime of the product is over and it is dicscarded. Although a solid waste is indicated in the discourse, all gas, liquid, and waste phases of natural products and their associated waste is taken into consideration (Almeida et.al., 2021).

This approach of minimization of the use of resources and the generation of waste has an affirmative effect on the economy of the whole system and therefore it can be said that these afore stated principles of circular economy are important in economic development as well. This is an innovative case for sustainable development where the purpose is to increase economic gains while having a positive effect on the environment. Naturally, as businesses have been governed by legislation in respect to their environmental effects meanwhile as a rule of thumb of doing business, they tend towards using less resources and increased system efficiency for increasing financial gains. In this

respect, circular economy is not a new phenomenon. Fitch-Roy et.al. (2021) have questioned whether the recent global diffusion of circular economy regulatory policy packages (CERPPs) raises questions over their extent, composition, and potential effectiveness while Bjornet et.al. presented one of the relatively rare examples of cases in circular economy.

Although efforts towards a circular economy can be slow (Grafstrom & Aasma, 2021), where it makes a difference is that circular economy may present such tools that without disrupting financial gains for the day and the future, new mechanisms and way of doing business aid in businesses in protecting their financial gains and at the same time protecting the environment. Examples of such tools are the ones discussed in this paper.

While trying to understand the ways of transforming businesses as players of circular economy, climate change is a global issue with its huge threat to the current state of doing business. Circular economy in its purpose of saving resources and increasing system efficiency, minimizing the final disposed waste, can present an opportunity for especially climate change mitigation. Climate change is an outcome of global warming, which can be briefly described as the increasing of global temperatures due to increased greenhouse gas emissions, creating a thicker layer of these gases in the atmosphere resulting in disruption in the solar radiation balance of the earth. Intergovernmental Panel on Climate Change (IPCC) has been coordinating all issues regarding climate change and tries to set the much needed research foundation for a global policy. IPCC bases climate change efforts in two tracks as climate change mitigation and adaptation.

Climate change mitigation as the name suggests is the prevention of emissions of Greenhouse gases into the atmosphere while adaptation is to adjust the businesses, cities as well as communities to the major and sudden changes and their long term effects in the whether conditions. The aim is for the required changes for all stakeholders including individuals, businesses and even governments, in their daily living, consumption patterns, doing business or even setting country policies as well as implementation means, to make the necessary changes so that effects of climate change will be minimized (Duran-Romero et.al., 2020). The two major outcomes of climate change is abrupt sudden or unusual weather conditions and the massive changes to especially rain-drought patters and temperature changes so that natural fauna and flora will be effected.

3. CORPORATE SOCIAL RESPONSIBILITY DISCOURSE

When Social Sustainability is considered for an institution, it is divided into three sections which are employees' welfare, society's welfare and Business Ethics. Employees' welfare means to protect and oversee the fundamental rights of employees, to encourage the positive behaviour of employees and to contribute to the life quality of employees. On the other hand, society's welfare means to understand the broad denominator need in order to improve the welfare of the communities where the company operates and generally the educational, cultural and socio-economic welfare of the society. Business Ethics infers to support the protection of human rights within the company's domain and to encourage honesty, integrity and justice in all aspects of business operation.

On the other hand, economic sustainability means, in order to create long-term shareholder value by means of creating stock value and through obtaining a competitive income in investments, through protecting the assets of the company and through increasing the prestige and brand image of the company, to integrate this issue to operational implementations and to improve the capacity for economic development in communities, regions and countries where the company operates, through economic growth.

As for Environmental Sustainability, which happens to be the third main pillar of Sustainability, it means to minimize the environmental impact, to exert to minimize the operations, products and services in order to eliminate their negative impact on environment and human health, to conserve natural resources, to promote the sustainable use of renewable natural resources and to conserve and wisely use the non-renewable natural resources.

At this point, two new titles can be added to these three titles. The first of these two is Cultural Sustainability, which can be analysed in two parts such as corporate culture and social culture. Corporate culture, i.e. Organizational Culture is a unity of corporate characteristics which each corporate employee and every activity follows up and internalizes, whereas Social Culture is the potential of corporations' values to influence the society in a good or bad way, as every corporation is influenced by the cultural structure of the society it belongs to and likewise the corporations influence the societies. Finally, the fifth pillar which can be called governance sustainability covers the implementation method of all decisions taken to make, plan and implement the strategy of all functions of a corporation. It presents corporate managerial staff and the corporate

organizational structure, the priority of the role of sustainability in corporate activities and related implementations.

4. TOOLS OF THE TRADE AND THEIR EFFECT ON CLIMATE CHANGE

As the circular economy serves the requirements of corporate social responsibility, it has become a prevalent approach in recent years and has begun to be included in the strategies and statements of corporations. However, while being clearly expressed as a concept, when it comes to actual implementation, circular economy practices cannot be listed down in a comprehensive way and corporations are usually faced with uncertainty in this regard. In line with its global development, corporations in Turkey have started to utter the word more frequently. Although the circular economy term is a relatively recently coined term, there are some existing structures globally as well as in Turkey already serving for this purpose. These below discussed structures in Turkey pose the potential in terms of improvement for exchanges, practices and implementations regarding climate change mitigation and adaptation.

In general, industrial agglomerations consist of a piece of land designed specifically to promote industrial activities through integration with transportation facilities and other supportive infrastructure as well as various other governmental supports (Walcott, 2020). In Turkey there are several different types of such agglomerations serving as circular economy tools.

Organised Industrial zones (OIZ) are the earliest examples of aggregating a group of industries in order to provide them with improved access to basic services. OIZ implies production zones for goods and services, allocated for industry in a planned manner and within the scope of certain systems and established, planned and operated in accordance with the provisions of this Law by equipping the lands with approved boundaries with necessary common use areas, service and support areas and technology development zones within the ratios of the zoning (master) plans, which aim at productivity in resource utilization in order to ensure the settlement of industry in appropriate areas, to prevent distorted industrialization and environmental issues, to conduct urbanization, to use resources rationally, to benefit from information and information technologies, to place and develop industrial types within a certain plan. The common use areas of these OIZs refer to the social, administrative and technical infrastructure and service areas and parks under OIZ's property and possession which ensure that they duly operate for OIZ's

objectives, excluding the roads, infrastructure and energy lines and health protection strip planned within the OIZ area. Due to this structuring, it is aimed to fulfil the following objectives of OIZs: Disciplining the industry, contributing to the planned development of the city, ensuring the productivity and profit growth in production by enabling the industrialists who complement each other and encourage each other's waste product to produce together and within a certain program, spreading the industry in underdeveloped regions, disciplining the use of agricultural areas in industry, establishing healthy, inexpensive, reliable infrastructure and common social facilities, and finally preventing environmental pollution through joint treatment facilities. According to Higher Board of Organised Industrial Zones (OSBUK), as of March 2021 there are 349 Organized Industrial Zones in 76 cities either planned, under construction or already in operation. Some of these OIZs are specialized industrial zones, namely those SMEs under a certain sector or subsector, while others are mixed, namely a mix of SMEs from various sectors or subsectors. These 349 OIZs cover a total area of 104 286 hectares (OSBUK, 2021).

Industrial Zones: The purpose of the industrial zones is to provide investment areas suitable for large-scale and technology-intensive investments. The industrial zones have been defined in 2002 in Industrial Zone Regulations in respect of Industrial Zones Law Nr.4737 published in the Official Gazette No.26645 (EBK, 2002) as: 'The production zones created by equipping the lands with approved boundaries with necessary infrastructure services, allocated for industry and which can in no way be used for other purposes, in order to encourage investments, to direct the savings of Turkish citizens working abroad to invest in Turkey and to ensure the increase of foreign capital inflows.

6 private industrial zones, as mixed or specialized, are planned in Bursa, İstanbul, Martin, Balinese and İzmir. The advantages of private industrial zones can be briefly listed as follows: Exemption from necessary infrastructure expenses and, if required, exemption from expropriation expenses, facilitation in operations such as maps, investigation reports, zoning (master) plans, infrastructure and superstructure projects and building license, occupancy permit, business license and exemption from expenses, time-wise facilitation for Environmental Impact Assessment Report and related permissions, land use permissions and finally exemption from taxes and charges and other incentives.

Free zones are defined as special sites within the country that are deemed to be outside of the customs territory. These are actually fenced-in areas in which specific regulations are set for the companies, all for the promotion of exports. With the aims of promoting export oriented investment and production, accelerating foreign direct investment and technology access, directing enterprises towards export and developing international trade, currently there are 18 free zones operating in Turkey. Frees zones are different then the other structures described in this study but still is a promising tool for the improved impact on circular economy and climate change (MOE, 2021).

As stated by the International Association of Science Parks (IASP, 2021), it is an enterprise that is in either an official or activity-based relationship with one or more university or higher education institution and research centres; and embodies a management function with specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. While Techno park (technopole) concept is mainly used in France, these entities are referred to as "Research Park" in United States, as "Science Park" in the UK and as "Science City" or "Technology City" in the Far East. In the Technology Development Zones Law No. 4691, only one concept, "Technology Development Zone" is used.

The most known definition Industrial Symbiosis is the exchange of not-wanted material -many times referred to as waste- of one company with a second company, although such exchanges can be done with services or infrastructure (Chertow, 2007). The main problem with this initial definition of waste exchange where a companies waste is the feed of another one, face serious obstacles such as mistrust and lack of information and may need external guidance or governance (Jato-Espino & Ruiz-Puente, 2021). The IS literature structurally splits in two: designed IS and spontaneous/self-emerging/self-organizing IS. Eco-industrial parks are examples of designed IS although cases in which a simple industrial zone (IZ) evolves into an eco-industrial park via the recognition of self-emerging IS opportunities over time are encountered (Genc et.al., 2020) Additionally, IS examples can be achieved within industrial agglomerations (Hu, et.al, 2020) or can be planned as one from the initial implementation, such examples are usually called as Eco-Parks (Hu et.al., 2020). Clusters are industrial patterns where complex interchanges of all actors dealing with one sector in the form of supply chain, utility and service sharing, and

by-product and waste exchange (UNIDO, 2017) and there have been a global tendency in cluster formations where competition and cooperation dynamics may exist simultaneously (Sosnovskikh, 2017). In Turkey, there have been state-lead or spontaneous industrial symbiosis (Ozkan, et.al., 2018) as well as cluster examples and governmental policies as well as associating incentives exist to increase these formations (Bacak & Altas, 2011; Yasar, 2013).

Climate change mitigation and adaptation of industrial agglomerations can be discussed in respect to the 5 pillars of corporate social responsibility, namely, environmental, economic, social, cultural and governance. For the validity purposes of this study, a focus on economic, environmental and social aspects has been established since the field work on culture is negligible. For the sake of the study governance aspects are included as a crosscutting issue to the economy, environment and social pillars.

In principle, industrial zones acting as a catalyst for economic development has been the major driver for establishing such agglomeration of industries for a long while and many cases have been presented. Giannecchini & Taylor (2018) discusses the cooperation between China and Ethiopia for this purpose. Although economic impacts are the main purpose of such industrial agglomerations or circular economy tools and as aims to not to just to aid in the overall regional economic development but also has the potential to improve the economic welfare of the neighbouring areas by providing jobs or creating sub-sectors servicing these zones and a good example for this is Eslamizadeh et.al. (2020)'s study on industries being a party to collective action and a mutual benefit is reached with the neighbouring areas. Regarding environmental impacts, as expected, all industrial agglomerations create a pollution as a result of operations (Fan & Fang, 2020; Chen, et.al., 2020; Fayomi, et.al., 2018), however, this pollution can be better controlled and disposed in a collective way in the industrial tools mentioned in this study. Butturi et.al. (2019) discussed the renewable energy use in eco-industrial parks while Catalbas et.al. (2021) presented the use of green roofs as well as their potential on climate change in industrial zones. Dursun, et.al. (2019) have presented an analysis specific for Turkey, with the aim of proposing a decision-making model based on data envelopment analysis to evaluate the relative efficiencies of OIZs located in the Eastern Black Sea Region of Turkey, recognising that such production areas of goods and services that are established to provide planned industrialization and planned urbanization by structuring

the industry in suitable areas, to prevent environmental problems, and to provide efficient use of resources. There are many other studies for specific cases where environmental impacts of such industrial zones have been carried out in respect to both advantages and disadvantages offering clarification to trade-offs and synergies (Fouladi, et.al., 2021; Guo, et.al., 2020). When social and cultural impacts are to be reviewed, it can be stated that such tools with all of their stakeholder eco-systems have a direct exchange of interactions with them. Some examples for these could be listed as the families of employees, universities or in general academia in cooperation or the companies along the supply chain. In this respect, circular economy with all its possible tools are not only environment or economy based but rather it has significance over ethical and sustainable business practices (Gupta, et.al., 2021). Hong and Gasparatos (2020) have reviewed the Chinese government's eco-industrial parks programme dating from 2001 and stated that non-economic and non-environmental studies are still scarce and research needs to focused in these aspects. Governance pillar is also being discussed in various studies. Jin et.al. (2020) presented where a game model of government value compensation for different types of industrial waste recycling in industrial parks implemented where the government decision-making process regarding value compensation, and the firm waste-recycling decisions are evaluated, accompanied with a case study for model verification. As presented afore, governance can be done on the zone level but still needs regional or country based policies for a dedicated transition to circular economy which will have direct effects on climate change mitigation and adaptation (Kern et.al., 2020; Marco-Fondevila et.al., 2021).

To enhance the transformation capacities for industrial agglomerations in Turkey as circular economy tools which will aid climate change mitigation and adaptation, and eco-transformation is needed with effective policy, governance strategies as well as implementation guidelines. Zhao et.al. (2021) discussed this need and stated that this process may take decades and requires the patience of policy makers unless "latecomers" of eco-transformation of industrial agglomerations need to detect the signals of emerging local initiatives and facilitating them into nation- wide practices.

Table 1: Impacts of the selected current tools of circular economy can be summarized below.

	Environmental	Economic	Social and cultural	Governance	Climate Change Mitigation	Climate Change Adaptation
OIZs	Direct	Direct	Direct	Direct	Direct	Direct
IZs	Direct	Direct	Direct	Direct	Direct	Direct
FZs	Indirect	Indirect	Direct	Direct	Indirect	Direct
TPs	Indirect	Indirect	Direct	Direct	Indirect	Direct
Clustering	Direct	Direct	Direct	Direct	Direct	Direct
Industrial Symbiosis	Direct	Indirect	Direct	Direct	Direct	Indirect

5. CONCLUSION

The discussions and research on Turkey's economic policies and their relevant implementation practices have long been studied. Organized Industrial Zones, Free Zones, Techno Parks, Clusters, industrial symbiosis examples and the more recent Industrial Zones are such examples of tools to enhance the economic development by assisting businesses with proper incentives. Advancing further from the economic development, these tools have the potential to decrease environmental pollution and not just the climate change problem but also all kinds of pollution starting with the use of resources to soil or water quality degradation. This is all in line with the long standing but relatively recently phrased term 'circular economy' which is best described as the wise use of all resources, especially natural resources, while increasing efficiency as well as reducing waste.

As the effects of climate change increase, it is inevitable that governments and private sector will initiate their own practices for mitigation and adaptation. In this respect, the importance of tools discussed in this study will be emphasized as they are good examples for economic development hand in hand climate change mitigation and adaptation. Nevertheless, it should be stated that all these tools should be revisited, stakeholder analyses should be carried out, to broaden this effect as these tools should also be reviewed for their climate change significance alongside their economic advantages. The fact that climate change in itself is not solely an environmental issue nonetheless is very closely linked to social, cultural and governance issues, create new complexities and their associated uncertainties, meanwhile presenting the opportunity for improvement not in only one pillar of sustainability, but rather the whole of the pillars; namely economic, environmental, social, cultural and governance. In this way, the tools

discussed in this study will and can become pioneers by becoming foci for a wholesome take on integrating the principles of circular economy to actual practices for Turkey.

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