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Circular Economy and Employment Nexus: A Systematic Review

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Abstract

Generally, the circular economy (CE) refers to the reuse of old products through refurbishment. The CE reduces the burden of waste by redesigning old products into new ones. On the other hand, employment indicates a situation in which people are connected with work that helps them to earn, while unemployment shows the opposite side of employment. This is a secondary study. The PRISMA method was used to acquire the data for this study. It was tested whether the CE has an impact on increasing the employment rate. Findings indicate that many scholars stated that the CE has the potential to improve the employment rate and reduce the unemployment rate, whereas others found that the CE has little impact on employment generation. In conclusion, to achieve better results from the CE, policymakers should include waste from sectors, such as household waste. Also, all countries of the world should be included, not only the developed countries.

Keywords: Circular Economy, Employment, Unemployment, and Developed Countries.

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1.0 Introduction

The main principles of the current linear economic structure are 'take, make, and dispose of,' whereas a new, environmentally vivid economic structure is the circular economy (CE) whose core principles are 'design out waste and pollution', 'retain products and materials in use', and 'regenerate natural systems', and is regarded as an alternative to the conventional linear economic system (Wright et al., 2019). Similarly, the take-make-dispose approach to substances, which is harmful to the environment, is the principle of the linear economy and is unable to meet the demands of an increasing population. On the contrary, the CE, which is helpful to the environment, is committed to eliminating waste by redesigning and reusing it (Sariatli, 2017).

The concept of CE ascended as an ecologically friendly aspect, and it would substitute the current linear economic structure (Hossain & Khatun, 2021). Lately, the CE attracts attention as a substitute for the conventional perspective of "make-use-dispose" (Kumar et al., 2019). Also, the CE proposes a chance to

augment and encourage sustainable production and consumption using ongoing development and boundless capital (Govindan & Hasanagic, 2018). Likewise, the CE is being viewed as a dominant factor over the years towards attaining international, countrywide, and local sustainable changes. To ascertain sustainable development in the future, the current linear economic model has to be transformed into the circular economic model (Halog & Anieke, 2021). The garbage and environmental contamination are being greatly reduced by the CE (Bai et al., 2021). Moreover, serious emphasis is given to lessening the degradation of natural wealth in the CE (Rahman & Kim, 2020). Furthermore, the aim of the CE is to utilize the waste in a way that the garbage will generate economic value and will be used to maintain circularity. It has a great role in increasing output and uplifting the competence of both natural and human resources (Azizuddin et al., 2021).

Nevertheless, the CE is being exercised primarily in developed countries rather than in underdeveloped countries (Halog & Anieke, 2021). Correspondingly, the approach of CE is barely followed in underdeveloped countries compared to developed countries from both environmental and sustainable perspectives. One of the most crucial negative effects of the CE is the product's value deviation (Dulia et al., 2021). Additionally, the major obstacles to CE adoption include a scarcity of financial, technical, and human capital, managerial resistance, and end-user disregard for sustainability (Papagiannaki, 2022).

Generally, the recycling process of the circular economy is primarily exercised in developing countries. A taboo was in people's minds that secondhand products are not good in service; that's why the reuse of the product cannot attract people. However, it is now being changed in the developing countries because a lot of people are engaging in buying or selling secondhand products through Facebook (Ahmed et al., 2022; Arman & Mark-Herbert, 2021).

On the other hand, there is a limited exercise of CE in underdeveloped countries. Also, there are a lot of obstacles to implementing the CE in those countries. It includes technological, policy, and participation barriers. Likewise, technological impediments include a lack of knowledge of modern technology and nebulous advantages of using technologies. Secondly, policy barriers include unclear aims and outcomes of the CE, insufficient funding, a limited proper policy framework, limited academic knowledge, and a lack of organizational knowledge among personnel. Finally, ignorance and an attitude toward environmental pollution, lack of understanding about environmental issues, and motivation (Ahmed et al., 2022).

2. Literature Review

A report by the International Labor Organization (ILO) reveals that approximately 3 billion people are engaged in work, whereas 205 million people are unemployed. Likewise, the ILO report shows that the employment rate of the world is decreasing from the previous year. The employment rate was 61.7% in 2007, 61.2% in 2009, and 61.1% in 2010. This data confirms that the employment rate is decreasing year by year, which means the unemployment rate is increasing day by day (The Guardian, 2011).

The increasing trend of unemployment is alarming for all countries. However, by implementing the circular economy, unemployment can be reduced on a large scale (Dewi & Pratama, 2021). Enhancing employment opportunities means the reduction of unemployment. The circular economy is able to generate more employment opportunities (Campagnaro & D'Urzo, 2021). Also, the circular economy and job growth have a positive relationship (Horbach & Rammer, 2020).

Ahmed et al. (2025) revealed that the CE is helping Bangladesh make notable contributions in achieving several Sustainable Development Goals (SDGs) like decent work and economic growth (SDG-08), industry, innovation, and infrastructure (SDG-09), and responsible consumption and production (SDG-12) on a large scale despite extensive drawbacks, including a lack of skilled personnel, administrative proficiencies, and policies. Furthermore, they demonstrated that resource proficiency and the reproduction of products have enhanced employment opportunities, improved production efficiency, and increased innovation within industrial sectors.

3. Objective

There are a lot of studies conducted on the applicability of the circular economy, while there are a few studies conducted on the role of the circular economy on employment enhancement or reduction. To meet the existing knowledge gap, our study emphasizes-

i. I. The role of the CE in employment creation or decrease.
ii. II. The role of the CE in Bangladesh.

4. Methodology

This study was conducted on a secondary basis. All data have been collected from the published journal articles by using the PRISMA system to get the most relevant studies for our studies. To fulfill the aim of this study, we searched in SCOPUS using the keyword "{circular economy}AND (employment OR unemployment)" from 27 May 2023 to 02 June 2023. We found a total number of

289 papers in SCOPUS during the identification process. Since this study was conducted from a social perspective; that's why we limited the resources to Social Sciences, Economics, and Business Administration. Secondly, the search criterion was limited to the English language to perceive the real meaning of the previous study because this study was also conducted in English. Finally, we limited the search to the 2015-23 timeframe and Journal and Review articles to avoid the burden of studies. After finally applying all the limitation criteria to the search, we got 84 papers at the screening stage. After reading the titles and abstracts, we primarily selected 28 papers at the eligibility stage for our study. We then thoroughly scrutinized the papers, and finally, 14 papers were selected at the inclusion stage.

Table 1: resource selection through using the PRISMA method

Methods	***Searching***	***Documents selection***
Identification	Searched in SCOPUS.	The total number of papers was (n=289).
Screening	After limiting the resources to the most relevant fields.	The total number of papers was (n=85).
Eligibility	After reading the titles and abstracts of the papers.	The total number of papers was (n=28).
Inclusion	After reading the full texts	Finally, selected papers were (n=14).

Source: author generated this table to structurally present the data according to the PRISMA method

In addition to the selected studies, we collected papers mentioned in their reference lists. After studying those papers, we used them as our requirements.

Also, we collected a lot of studies about the circular economy to enrich our understanding. Secondly, to understand the real situation of the circular economy from the world's perspective as well as Bangladesh's, we studied several studies that helped us deepen our understanding of the world and Bangladesh's perspectives. Finally, we searched for and collected studies from various journals, newspapers, and websites on the employment and unemployment situation in the world and Bangladesh, as this study focuses mainly on the role of the circular economy in employment generation and unemployment reduction. We collected all the abovementioned resources using Google Scholar, Semantic Scholar, ResearchGate, and a web browser.

5. Findings

5.1. Circular economy and employment generation

Table 2: Circular economy in employment expansion

Authors	**Methodology**	**Country context**	**Relationship**	**Specific condition(s)**

(Repp et al., 2021).	Quantitative	Multi-countries	The CE enhanced employment in the reuse and recycling sector.	Reuse Recycle Retail sector
(Horbach & Rammer, 2020).	Quantitative	German	There is an optimistic relationship between the CE and job growth at firm level.	Firm sector
(Moreno-Mondéjar et al., 2021).	Quantitative	European Union	The CE has a lot of possibilities for increasing more green jobs.	Green jobs
(Connolly et al., 2016).	Quantitative	Scotland	The CE-related employment opportunities increased in low-carbon and renewable energy technologies.	Low-carbon-based production Renewable energy sector
(Rudan, 2023).	Qualitative	Croatia	The CE helps the local economy by generating jobs through tourism.	Tourism Local economy generation
(Raillard, 2021).	Descriptive	France	The circular economy is a great source of local employment.	Local employment
(Dewi & Pratama, 2021).	Conceptual study	China	The CE can generate a fresh workspace for people, especially for city people.	City area
(Sulich & Sołoducho-Pelc, 2022).	Conceptual study	European union	The CE augments a huge number of Green Jobs.	Green jobs
(Niang et al., 2023).	Conceptual study	France	The CE created more jobs than the entire job creation. The CE is mainly based in the metropolitan areas.	Metropolitan areas
(Campagnaro & D'Urzo, 2021).	Qualitative study	Italy	The CE is able to create new employment.	Not identified
(Laubinger et al., 2020).		-----	The CE is able to play a vital impact on employment generation.	Not identified
(Aguilar-Hernandez et al., 2021).	Quantitative study	------	The CE will create more employment in 2030.	Not identified

Source:author generated this table reviewing the literature of 3.1

5.1.1 Environmentally friendly employment generation

The CE is a new effort to achieve economic and employment growth, as well as environmental development, by reducing resource use. Likewise, the CE has

attracted serious attention among EU policymakers regarding employment generation and environmental development. Unemployment is a drastic problem and the CE is expected as an actor to relieve this problem. The EU sat a plan that they would fulfill the environmental demand and generate up to 3 million fresh jobs by 2030. The adoption of the CE has increased employment opportunities, using fewer resources than before the CE adoption in most countries that adopted the CE. New jobs will be created in the renewable and service sectors, whereas employment will be reduced in the mining and manufacturing sectors (Wiebe et al., 2019). According to the EU, governments also urge the generation of job creation, which can be achieved in the CE along with environmental development (Laubinger et al., 2020).

5.1.2 Employment generation in the waste and recycling sector

Employment indicates the socioeconomic status of a person, and it is an important indicator of social sustainability (ILO, 2013; Repp et al., 2021). The CE is an economic dogma proposed by the EU that aims to modify the pattern of production's inputs and outputs, which is probably affecting the extent and circulation of employment (Pianta, 2006; Repp et al., 2021). However, conversion to the CE can enhance job opportunities in sectors that do not need more workforce, such as reuse and recycling sectors within the EU and used retail businesses within and outside the EU. The EU pointed out that the CE has the capacity to create up to 700,000 jobs in the EU. The landfilling sector does not need more labor; it replaces the large labor-intensive recycling sector, and it will notably generate more job placements in waste or garbage management. Likewise, according to the ILO, the CE will grow an amount of additional 6,000,000 work opportunities in global plastics, glass, wood pulp, metals, and minerals recycling in America and the EU, while a lot of work will be diminished in Asia, Africa, and the Pacific region(Repp et al., 2021). According to Green Alliance/WRAP2, Britain will benefit by 2030 from the development of the CE. Almost 46,7004 people got jobs in the CE practices in London. Also, the CE generated 16,000 new jobs in the recycling, reuse, repair, and remanufacturing sectors. These 16,000 jobs are equivalent to a 34.9% increase in total CE-related jobs in London by 2030 and will reduce net unemployment by about 5,500 people in London. Moreover, the CE that would reduce net unemployment to all but 12,000 people could provide more than 40,000 new jobs, and the CE acted as a prominent actor in job reduction (Mitchell, 2015). Also, repair, maintenance, reuse, and reutilization of products play a vital role in creating circular jobs; they generated 243,167 jobs (42% of the total circular jobs), while waste management generated 30% of the circular jobs (Niang et al., 2023). After implementing the CE principles in China, there was a massive growth in the service sectors, especially in the recycling sector,

and many recycling companies were established, recruiting many new employees to run their businesses (Dewi & Pratama, 2021; Wei & Liu, 2012).

5.1.3 Employment opportunities in renewable energy sectors

The EU can benefit from implementing the CE in its member states by introducing new businesses, which will finally reduce local unemployment rates and employ more workers in these countries (Geerken et al., 2019). The government of Scotland set a goal to use 100% renewable energy, and this sector might generate an additional 60,000 jobs by 2020. 26,000 jobs would be generated in the renewable energy sector, 26,000 in low-carbon technologies, and 8,000 in the environmental sector, among the total of 60,000 (Connolly et al., 2016).

5.1.4 Role of the CE in national employment

It is thought that local authorities will benefit from introducing new CE-based activities because they provide more jobs in the local area. The CE has a great opportunity to generate more jobs and can play a vital role in the national economy. The CE practices created about 2%, which is equivalent to 576,000 jobs in France in 2015. Also, the CE-backed employment was higher than the net employment between 2008 and 2015 timeframe (Niang et al., 2023). The CE is able to provide an optimistic output for resource efficiency and employment opportunities at the same time. The net effects of the CE are optimistic in employment generation. For example, the EU predicted that it could generate over 170,000 employment opportunities by 2035. Also, France stated that if they could execute the CE practices, they would create up to 300,000 fresh jobs. Moreover, A significant amount of 75,000 jobs will be generated by implementing the CE in Finland (Laubinger et al., 2020).

5.1.5 Green jobs

Climate change is opening a chance to generate more and more green jobs because the business corporations will introduce pollution or termination-control technology to the existing equipment, and it will generate new jobs to manage this function (Sulich & Sołoducho-Pelc, 2022). It can be connected employment generation in the CE to employment generation in the green economy (UNEP, 2008). An optimistic and noteworthy impact of eco-product introduction on employment. The positive impact of eco-innovation seems better than that of those that are not related to ecological goals (Horbach, 2010; Horbach & Rammer, 2020). Also, both environmental and non-environmental commodity orientations generate employment growth (Licht & Peters, 2014). Furthermore, More employment in technology-related fields closely related to

the CE, such as end-of-pipe technologies, has a negative impact on employment, whereas other technologies, such as recycling and energy and resource efficiency, do not (Horbach & Rammer, 2020; Horbach & Rennings, 2013). Moreover, the cleaner production is probably generating more employment (Pfeiffer & Rennings, 2001). One of the important principles of the CE is to reduce the usage of raw materials, power, and water in the production process through introducing ecoefficiency. Thus, the CE will play a vital role in developing the environmental health as well as generating green jobs. Adopting eco-technology has an optimistic impact on employment if the trend is the hiring of new employees to open their business. The CE transition will generate a lot of green jobs, though the number of green jobs will depend on the extent of innovation in inventions. Since companies and business organizations will adopt sophisticated technology in their firms, they will therefore recruit a significant number of employees with specialization in green jobs, employment efficiency, and abilities, thereby increasing the net employment rate. CE-related firms have a strong potential to create green jobs in a job market where energy reduction plays a vital role in generating significant numbers of green jobs. Also, water scarcity is linked to generating green employment. Furthermore, waste management can create more green jobs. Ecological or environmentally friendly jobs will be generalized in newly oriented companies whose emergent is based on the CE perspectives. The effect on green jobs or employment relied on the recycling process sector (Moreno-Mondéjar et al., 2021). Also, there is a strong positive relationship between ecologically based products and services and the generation of new green employment. Specifically, the emergence of green goods and services have an optimistic role in generating green jobs (Cecere & Mazzanti, 2017; Moreno-Mondéjar et al., 2021). Likewise, the newly introduced renewable energy markets are likely employment-friendly because they require more employees to operate (Horbach, 2010; Moreno-Mondéjar et al., 2021). Also, there is a positive link between firm openness and employment. Since the CE transition needs more new companies, it will strengthen employment opportunities (Moreno-Mondéjar et al., 2021).

5.1.6 Fresh or new job opportunities

The demand for additional investment, particularly skilled workers, may directly increase workers' demand. There may also be positive employment effects from process-related CE innovations if productivity increases lead to higher price competitiveness and hence higher demand for the innovator's product. For producing entirely new commodities, the CE may need more firms to produce those products, which will create higher demand for labor. Notwithstanding, it will not refer to the fact that the whole employment is

increased by the growing CE. If the current CE co-exists with the old labor-based product generation and does not replace the old, massive workforces with advanced technology or CE-induced production, it will indicate net positive employment induced by the CE (Horbach & Rammer, 2020). Some basic principles of the circular economy are to encourage transparent technology, green markets, and the protection against the negative impacts of environmental change. Thus, the circular economy also enhances new employment opportunities (Dewi & Pratama, 2021). The implementation of the CE is changing business practices, which will ultimately create more employment opportunities. For example, China is trying to make raw materials from the used goods. Thus, the changing business patterns will play a positive role in creating more jobs (Dewi & Pratama, 2021; Nechifor et al., 2020). Apart from uplifting the industrial sectors in China, the CE also positively influences the job or employment sectors. The waste management creates more jobs for the CE introduction in China. Also, the CE provides significant employment in environmentally friendly companies (Dewi & Pratama, 2021). In China, a significant number of audit firms were established to investigate green production, and industries were creating more and more environmentally friendly jobs (Dewi & Pratama, 2021).

5.1.7 Industrial sectors' job creation

The CE can provide more fresh employment opportunities across three industrial sectors: primary, secondary, and tertiary. Primary and secondary companies will create new employments in waste management- for example, collecting agricultural waste, livestock waste, and production waste. On the other hand, the tertiary level will create more jobs by implementing environmentally friendly industries. Previously, the CE created fresh jobs in the recycling sector in China. China secured 1.5 trillion in profit and created 20 million new jobs by implementing CE practices in 2013, though CE was newly adopted at the time (Dewi & Pratama, 2021; Geissdoerfer et al., 2017).

5.2.1 Uncertain employment generation

The role of the CE in employment generation remains unclear. If labor efficiency increases due to the CE, it will lead to labor reductions (Horbach & Rammer, 2020). Nonetheless, the CE-based employment generation is not without doubt because how the CE will generate new jobs is still nebulous (Wiebe et al., 2019). However, the overall departmental impact of the CE remains nebulous because it generates jobs in some sectors while reducing jobs in others (Laubinger et al., 2020). The CE-based jobs were generated, but this

employment was more volatile or temporary than net employment in Scotland (Connolly et al., 2016).

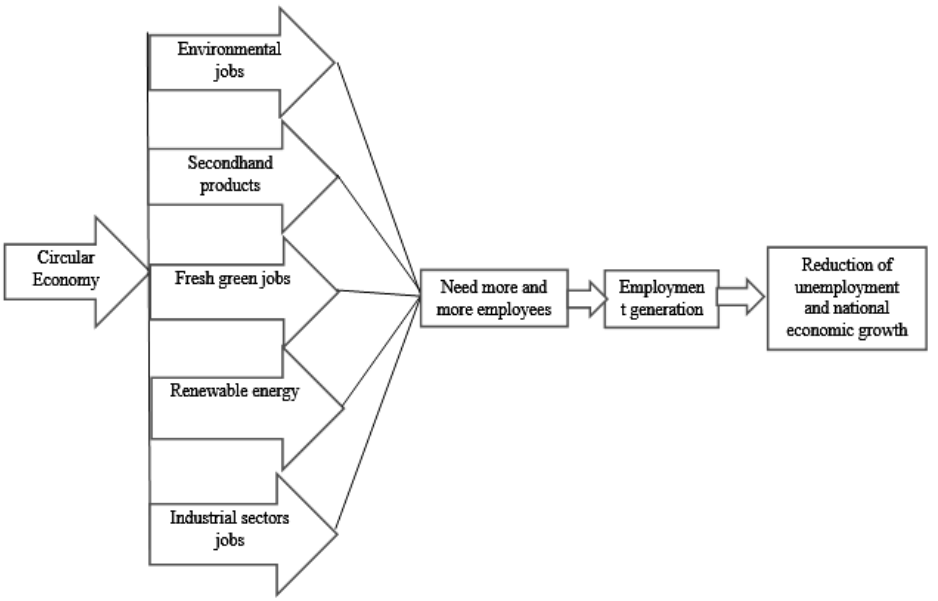

Figure 01: circular economy and employment generation

Source: Author generated this table from the abovementioned sources of 3.1

5.2 *Circular economy and employment reduction*

Table 3: Role of circular economy in employment reduction

Authors	Methodology	Country concept	Result	Specification
(Repp et al., 2021).	Quantitative study	Multi-country	The CE decreased employment in low to upper-middle-income countries.	Low to upper-middle income countries
(Horbach & Rammer, 2020).	Quantitative study	German	The CE has no important effect on labor efficiency.	Labor efficiency
(Connolly et al., 2016)	Quantitative study	Scotland	The employment opportunities offered by the CE were more temporary than those offered by other employers.	Volatile jobs
(Llorente-González & Vence, 2020)	Conceptual study	European Union	The CE increased low-wage labor.	Low-wage labor.
(Niang et al., 2023).	Conceptual study	France	CE-related employment is mainly concentrated in city areas.	No employment generation in

				rural areas.
(Laubinger et al., 2020).			The CE policies' impact on employment is still uncertain and challenging to measure.	Not identified
(Burger et al., 2019).		USA	The employment impact of the CE still remained unclear.	Not identified

Source: author generated this table to structurally present the data of 3.2

5.2.2 Reduction of employment in developing countries

Conversion to the CE can substantially decline employment opportunities in developing countries outside the EU. Especially in sectors highly dependent on a large workforce, such as apparel manufacturing (Repp et al., 2021). The CE decreases by 16 and 150 million jobs in the EU and other parts of the world, respectively, for growing the product's long-lastingness or product lifetime (Donati et al., 2020; Repp et al., 2021).

5.2.3 Replacing the workforce with the CE techniques

A total reform is needed throughout the production process to meet the CE requirements from the beginning to the end. This automation of the production process and the improved efficiency of labor may replace labor with capital. Nevertheless, an enlarged productivity of money or capital directly to a situation such as labor versus capital, would introduce a lower wage-based employment structure. The extended tenure of products creates a need not to produce more and more products, as their longer lifespans reduce sales and, ultimately, employment generation (Horbach & Rammer, 2020). Some workers will be replaced by CE practices because business patterns will change, for example, shifting from fossil fuels to renewable energy (UNEP, 2008). Whatever, automaton, technology, and updated reprocessing systems may abate the estimated labor requirements for reprocessing functions (Repp et al., 2021). Job reduction occurs when employees are removed from a job without being assigned another job. Also, the CE will close many business activities; for example, banning production that degrades environmental quality will lead to job loss (Laubinger et al., 2020). Also, the CE has a limited impact on employment at the firm level (Horbach & Rammer, 2020). The job reduction occurred in the mining sector (Wiebe et al., 2019).

5.2.4 No emphasis on generating rural jobs

CE practices are mainly based on city areas, and city authorities have included circular activities as a top priority in their first lists. However, there are few

activities in rural areas compared to the city, and the local areas are not heavily involved in CE activities. However, most people live in rural areas; therefore, they cannot live a proper life due to limited employment opportunities (Niang et al., 2023).

5.2.5 Based on the developed countries

Among all conducted studies, only 5% are based on developing countries, whereas the rest are based on developed countries. For this reason, the effect on employment by CE is hard to measure. Most developing countries depend on a large workforce, but CE techniques rely heavily on developed equipment; that's why developed countries are unable to keep up with CE (Kirchherr & van Santen, 2019; Repp et al., 2021).

6. Future research agenda

Most existing studies on the circular economy focus on industrial waste recycling. However, a lot of waste is generated in our homes every day, and we personally generate a huge amount of waste in our daily life. It may be a great research agenda for the future to explore how home-made waste can be recycled by the native people in their local area and how these products can be utilized in their daily lives. Secondly, engaging the whole of humanity in the circular economic process might be a future research agenda. Thirdly, it is often said that the condition of recycled products is not as good as that of original products. This may also be a future research agenda for the researcher: how to ensure the quality of recycled products so that they are in the same condition as the original products. After all, the researcher will have to ensure how underdeveloped countries will adopt the circular economy on a large scale.

7. Recommendation

CE practices are prevalent in developed countries, but are not predominant in developing and underdeveloped countries. Also, the data showed that most research on the CE was conducted in developed countries, while only 5% of studies were conducted in developing and underdeveloped countries, suggesting that the CE is not performed well in countries other than developed ones. Therefore, policymakers in developing countries should emphasize CE research and practice. On the other hand, the family waste or garbage is not largely included in the CE process. In that case, family waste should be included predominantly in the CE practices. Finally, all countries of the world should be included in the CE process, not only the developed countries.

8. Conclusion

The circular economy is a process of remaking used products to help us reduce the burden of waste that continuously pollutes the earth. Also, the circular economy is playing a vital role in generating employment opportunities. By

introducing more jobs across various sectors (recycling, waste collection), the circular economy is working to reduce the curse of unemployment. Also, the circular economy is creating opportunities for green jobs worldwide. However, scholars blame the circular economy for a nebulous impact on employment generation. Also, the circular economy is blamed for creating volatile jobs in sectors. Also, it is claimed that the circular economy generates jobs in one sector while reducing jobs in another. Additionally, the adoption of the circular economy is not universal to date, as it is mostly practiced in developed countries, and its implementation in underdeveloped countries is not widespread. Notwithstanding, the circular economy is a notion that can help us make a pollution-free world by recycling waste.

Authors' Declaration

We declare that the submitted manuscript is our original work and has not been published, nor is it under consideration for publication elsewhere. All sources have been appropriately cited, and the work is free from plagiarism, falsification, and fabrication. Any use of Artificial Intelligence (AI) tools in preparing this manuscript has been transparently disclosed, and full responsibility for the content rests with the authors.

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