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Circular economy model for developing countries: Evidence from Bangladesh

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Abstract
From environmental and sustainable development perspective, circular economy model is rarely applied in developing countries compared to developed nations. The aim of this paper is to review the overall scenario of the circular economy (CE) model in Bangladesh toward sustainable development. The study relies on the descriptive analysis of both qualitative and quantitative data, collected mostly from secondary sources with some in-depth interviews of the experts in the relevant field. The overall environmental status of Bangladesh, prospects, practices, and challenges of the circular economy model were thoroughly discussed in this paper. Though there are prospects to switching towards CE, the study reveals that the CE model's applicability is very limited in Bangladesh, being exercised mostly through recycling processes in some industries.

Keywords: Bangladesh, circular economy, 3Rs (Recycle, Reduce, Reuse), Pollution control, Sustainable development

Introduction

According to WHO, Bangladesh suffered 572,600 deaths by non-communicable diseases in 2018, where air pollution was the most risk factor (Koop, 2021). Additionally, according to the report of world development indicator, by the World Bank, CO_2 emission in Bangladesh (metric tons per-capital) was seen to increase steadily with a positive slope. In 1976, the value was 0.0777, this figure increased dramatically to 0.533 in 2016 (608 times higher than it was in 1976).

Moreover, according to Trading Economics, in Bangladesh, the unemployment rate is projected to be 4.2% in 2020. As a developing country with a demographic dividend, Bangladesh needs to create employment opportunity. In addition, Bangladesh needs sustainable industrial development and input resources to meet the Sustainable Development Goals (SDGs). In such situations, the circular economy model, which incorporates the 3Rs (Recycle, Reduce, and Reuse) concept as a guiding value for implementing circular economy in practice, may be a more realistic option (Yong, 2007).

Obstacles of CE implementation in various industries for a developing country, especially Bangladesh

Thus, this paper aims to explore the circular economy model in Bangladesh and its applicability to achieve sustainable practice in the industries of Bangladesh. Methodologically, the present study is a descriptive analysis of quantitative and qualitative data, collected mostly from secondary sources with some in-depth interviews of the experts in the relevant field. The secondary data sources used in the study are newspaper articles, editorials, magazine, journal articles, and grey literature.

In the following parts, in section 2 and section 3 a brief review of recent literature in the perspective of developing country, including Bangladesh has been added, and the methodology of this study has also been depicted, respectively. In section 04, the overseas practice of CE is showed, which aims to offer readers an insight into how CE is being widely used throughout the world so that the readers can compare the practice of CE in Bangladesh with the contemporary world. The subsequent sections include sector-wise current practices and prospects of CE in Bangladesh.

Methodology

The study is based on both primary and secondary data. Secondary data sources include published data from the World Bank, Trading Economics, World Air Quality Reports, and other published documents from various industries. However, primary data was collected using a semi-structured questionnaire as per qualitative data collection tools- Key Informant Interviews (KIIs) and in-depth interviews with the experts and professionals in the field of environment and economy of Bangladesh (The questionnaire schedule is attached in the appendix). For a specific review of recently published work (2018–2021), we collected published articles from the SCOPUS and Web of Science (WoS) database on 7 January 2022.

A significant number of applications of the circular economy model are visible through many innovative works such as making carpet out of plastic (Possioble, 2010), transferring bioplastic products to biogas (Vasmara and Marchetti, 2016), manufacturing paper out of elephants waste (Nishat, 2019). Even some companies are producing plastic highways (Bendix, 2019), making homes using old shipping container (Megan, 2020), manufacturing biodegradable cutlery (Barrett, 2019), producing lather bag using fish skin (Timmins, 2019), growing mushroom from coffee waste (Sayner, 2012), making of jeans from a waste plastic bottle (Webb, 2013), and turning of carpets to bikes (Braw, 2015). Table 2 presents major practices of CE model around the world.

Current practice and prospects of circular economy in Bangladesh.

Many industries and manufacturers are likewise concerned about reducing resource usage, resulting in less waste production. The recycled waste, however, is potentially insignificant compared to the produced waste. One of the most common recycling procedures is that garbage produced in cities is primarily collected by the urban poor, who are part of Bangladesh's informal sector. In the capital city Dhaka alone, 0.12 million poor people are involved with recycling waste directly or indirectly. In around 522 cities and towns of Bangladesh, the production and discharge of garbage is 13,332 tons per day, and yearly it stands to 4.86 million tons causing severe environmental pollution (Chowdhury *et al*., 2014).

According to Emerging Credit Rating Limited, Bangladesh ranked 89th in the world ranking of plastic export; the growth rate was 20% each year in the last two decades. Bangladesh consumed 3.5 kg of plastic per capita in 2014, according to the Waste Concern. Only 9.2 percent of total plastic consumption was recycled, implying that the remaining is discarded, damaging the environment in the process (Moazzem, 2016).

Ovi and Mahmud (2019) found that if the waste is collected from Dhaka with modern technology, about 75 percent can be turned into new products saving 7 billion in foreign exchange. This savings in foreign exchange will help to strengthen the economy, thus creating more job opportunities (Rahman *et al*., 2020). Furthermore, 137.57 tons of plastic are recycled per day in Dhaka, but the unfortunate truth is that health and environmental issues are not adequately addressed (Bangladesh, 2010).

Agricultural Sector

It is to be noted that Bangladesh's livestock sector emits 26.55 million tons of carbon dioxide equivalent greenhouse gases. According to K. N. Islam *et al*. (2021), applying circular economy-based concepts can result in a 37.5 percent reduction in emissions when compared to BAU levels. Moreover, in poultry farming, the 3R strategy is not followed in Bangladesh but rearing on the basis of reverse supply chain and 3R

Ship-breaking Industry

The ship recycling yards are mostly seen in the southern part of Bangladesh in the Chittagong area. A report released by the NGO shipbreaking platform stated that in 2018 Bangladesh had the world's highest volume of shipbreaking activities (Patwary, 2019). As a matter of fact, about 20 lakh metric tonnes of obsolete ships are recycled every year in different yards of Bangladesh. Most of the parts of vessels, mostly made of steel, are recyclable. This industry is also creating huge revenue and employment opportunities. Unfortunately, proper environmental and safety issues are not followed properly in these yards (K. Hossain, 2017).

Challenges to implement CE in Bangladesh

The Government of Bangladesh has prioritized environmental protection. According to Bangladesh's constitution, Article 18A states that the state shall endeavor to protect and improve the environment and preserve and safeguard the natural resource, biodiversity, wetlands, forests, and wildlife for the present and future citizens. Whereas the Article 12 of the Environment Conservation Act 1995 mentions that every industry must have Environment Clearance Certificate from the director-general. Moreover, the Environment Conservation Rule 1997 categorized different lists of projects for issuing the Environment Clearance Certificate. The four categories are Green, Orange A, Orange B, and Red.

However, the Environmental Clearance Certificate companies in Bangladesh are breaking the law and destroying the environment at an alarming rate, turning farmland into wasteland. (M. Yousuf, 2019). Even the concentrations of most polluting parameters in the effluents are too high compared with the respective allowable discharge limits (Azizul Haq, 1989). Research reveals that industries pollute air and water.

He further added, 'Our ignorance and culture to pollute the environment by generating waste, lack of understanding and motivation about the benefits of recycling, reducing, and reusing waste/products are the most critical public participation barriers in this regard.'

Conclusion

In Bangladesh, the circular economy is partly followed in different sectors. Recycling is most commonly practiced in major industries in Bangladesh. However, the model's overall execution is hampered by a lack of sufficient technological expertise and talent, a lack of public awareness, a lack of financial resources, ineffective policy, lack of research-based knowledge, and lack of implementation of the law, mostly due to corruption by officials. Bangladesh will benefit from the circular economy because it would prevent the country from over-exploitation of resources and pollution, resulting in overall sustainable growth. The government should encourage the practice of the circular economy in Bangladesh, and it should also implement the existing Environmental Law strictly.

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