

Circular Economy Practices and Challenges in the Industries of Bangladesh: A Case Study

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ABSTRACT

Circular economy (CE) is a concept that represents a paradigm shift from the conventional linear economic model—characterized by the "take-make-dispose" approach—toward a more sustainable framework grounded in the principles of "reduce-reuse-recycle." This transition emphasizes enhanced resource efficiency and the minimization of waste generation. While regions such as Europe and North America have made significant progress in integrating circular economy principles, Bangladesh continues to operate largely within a linear economic framework, exhibiting low levels of recycling and substantial waste accumulation. Circular economy awareness and implementation remain limited across most industrial sectors in Bangladesh, with only a few industries demonstrating preliminary engagement. Nonetheless, the country possesses considerable untapped potential for CE adoption. To investigate the current status and practices of the circular economy in Bangladesh, this study employed semi-structured interviews with key stakeholders across relevant sectors. Additionally, secondary data sources, including annual reports and industry publications, were analyzed to complement and triangulate the primary findings. In this paper, circular economy practices and challenges in a large home appliance manufacturing company of Bangladesh are explored and beneficial guidelines are suggested.

KEYWORDS: *Circular Economy, Home Appliance Industry, Sustainability.*

INTRODUCTION

The circular economy (CE) has emerged as a transformative framework for advancing the United Nations Sustainable Development Goals (SDGs). At its core, the CE emphasizes resource efficiency, waste minimization, and the reintegration of materials into production cycles. The global shift from the traditional linear economic model—characterized by the "take-make-dispose" paradigm—to a circular one has garnered widespread attention due to its potential to reduce environmental degradation and foster economic resilience [1–5]. In regions such as Europe and North America, circular economy principles have been increasingly embedded within industrial operations, particularly in the manufacturing and consumer goods sectors, where notable progress has been observed. However, despite growing international momentum, the implementation of CE practices in Bangladesh remains limited and underexplored [6].

Bangladesh continues to follow a predominantly linear economic model, with limited recycling initiatives and a high rate of waste generation. This prevailing approach exacerbates pressure on the country's already constrained natural resources and contributes to escalating environmental challenges. The relatively low engagement with CE frameworks within the national context contrasts with foreign developments and highlights the necessity of evaluating CE's potential applicability and benefits within Bangladesh.

This paper explores the current state of circular economy practices in a large home appliance manufacturing company of Bangladesh, namely Walton. It seeks to assess the extent to which CE

principles have been integrated into their operational models, and propose potential circular practices that could be adopted to enhance sustainability outcomes.

A mixed-methods approach was adopted to address these research questions, combining quantitative analysis with qualitative insights gathered through semi-structured interviews with industry stakeholders and experts. This methodological design facilitates a comprehensive understanding of the operational, economic, and environmental dimensions of CE implementation within the selected industries, offering a holistic overview of Bangladesh's current positioning in the circular economy discourse.

LITERATURE REVIEW

Circular Economy (CE) practices in Bangladesh are currently limited in scope and are predominantly interpreted as recycling activities within a few sectors. The broader adoption of CE principles faces several critical challenges, including technological constraints, inadequate policy frameworks, and low levels of public awareness and participation. Nonetheless, the implementation of CE strategies holds the potential to yield substantial environmental benefits—such as improved waste management and reduced pollution—as well as economic gains through enhanced resource efficiency and job creation [6].

The shipbreaking industry in Bangladesh plays a significant role in the national economy by supplying essential raw materials such as steel and iron, which support local construction and manufacturing sectors. This industry contributes to reducing reliance on costly imports and sustains a large number of jobs across the supply chain. Emerging technologies, such as Deep Neural Networks (DNN), are being explored to enhance efficiency in estimating recoverable materials from dismantled ships, thereby reducing processing time and improving profitability. Despite these economic advantages, the sector has drawn substantial criticism due to its adverse environmental impacts and poor labor conditions. Ahasan et al. [7] highlight the need to strike a balance between economic imperatives and the environmental and social responsibilities inherent to CE frameworks.

Understanding and leveraging the key drivers of CE adoption can inform more effective strategic planning and operational decision-making. Moreover, investment in advanced technologies and circular processes is crucial for aligning industrial practices with sustainability goals [8].

To date, research on circular economy practices in Bangladesh remains scarce, particularly in comparison to the extensive body of literature produced in Western contexts. This study seeks to address this research gap by investigating CE practices and potentials within the Bangladeshi industrial context with special focus on home appliance industry, thereby contributing to the growing discourse on sustainable economic development in the Global South.

METHODOLOGY

This study employs semi-structured interviews and secondary data analysis to examine Circular Economy (CE) practices. The integration of qualitative and analytical methods allows for a comprehensive assessment of both the current state and future potential of CE implementation in Bangladesh.

Primary data were collected through semi-structured interviews conducted with key executives from Walton. The number of such interviews was two and duration of each session was half an hour. The semi-structured interview format was deliberately chosen for its flexibility, allowing for open-ended responses and enabling interviewees to elaborate on their experiences, challenges, and strategic insights related to sustainability and CE. Interviewees were selected based on their direct involvement in sustainability or operational initiatives within their respective organizations. While a common thematic structure guided all interviews, industry-specific questionnaires were developed to capture sectoral nuances, with substantial overlap in core questions to ensure consistency and comparability.

In addition to primary data, secondary sources—including company reports, industry publications, and policy documents—were analyzed to contextualize findings and triangulate data obtained through interviews. These sources offered valuable insights into organizational performance, sustainability reporting, and existing CE-related initiatives, where available.

FINDINGS

Following the completion of the semi-structured interviews, the findings were systematically organized and presented in a tabulated format for clarity and comparative analysis. Table 1 summarizes the key insights obtained from the questionnaire-based interviews conducted with Walton.

Table 1. Key Finding from Walton

Material	Waste Stream	Circular Economy Practice	Outcome
Aluminum	100%	Melts and reuses aluminum for LED bulb parts	Reduced reliance on virgin aluminum, energy savings
Packaging and shield material	Sheet metal safety guards	Recycles materials, reduces landfill waste	Resource recovery, promotes a closed-loop system
Plastic	100%	Recycles for various applications	Eliminates plastic waste, creates new products from recycled material
Dining system	Waste	Biogas plant for electricity production	Generates renewable energy from organic waste, reduces reliance on fossil fuels
Burnable materials		Incineration boiler	Energy recovery from waste, avoids landfill disposal
Copper	100%	Makes Walton cable	Reduced copper mining need, minimizes environmental impact
Metal plate wastage		Makes lift counterweight	Utilizes waste material for new application, avoids additional production
Machine making section		Makes their machines	Increases self-reliance, reduces external resource dependence

From the interviews and secondary data analysis, it is found that Walton is one of the leading electronics and appliance manufacturing companies in Bangladesh, with a strategic focus on waste reduction and the integration of sustainability into its operational framework. Table 1 provides a concise overview of Walton's operational practices, based on data obtained through semi-structured interviews. In addition to material recycling, Walton has adopted several innovative waste management strategies. Notably, organic waste generated from the company's dining facilities is processed to produce biogas, which serves as a source of renewable energy and helps reduce dependence on fossil fuels. The company operates through a vertically integrated supply chain, which facilitates greater control over resource use and waste minimization. In instances where machine components become non-functional, Walton prioritizes the reuse of parts from obsolete equipment. Furthermore, the company engages in systematic repair and upgrading of machinery and components to maximize resource efficiency and extend the lifespan of its products. However, as a leading company in Bangladesh, it has

the potential to take further initiatives. These may include establishing electronic waste collection facilities through its own retail outlets and increasing investment in public awareness campaigns, among other measures.

CONCLUSION

The research mentioned in the paper demonstrates that, although awareness and implementation of Circular Economy (CE) practices in Bangladesh remain limited, the country holds considerable potential for CE adoption. Despite facing several challenges—including a lack of advanced technological infrastructure, inadequate policy support, and low levels of public awareness—Bangladesh has the opportunity to improve resource efficiency and mitigate environmental degradation. These improvements can, in turn, generate long-term economic benefits and support the nation's broader sustainability goals. This study highlights the urgent need for governmental support, strategic investment in technology, and public engagement to facilitate the transition toward a more circular economic model. The findings underscore the critical role that CE adoption can play in aligning Bangladesh with the United Nations Sustainable Development Goals (SDGs) and enhancing national economic resilience. However, this study is not without limitations. The most significant constraint was the limited sample size. Future research should aim to expand the scope of inquiry by including small and medium-sized enterprises (SMEs), which constitute a large segment of the Bangladeshi economy. Moreover, the development of a policy-oriented research framework would be beneficial for identifying practical interventions and regulatory mechanisms to support CE implementation. Continued research in this area will offer deeper insights and guide the formulation of effective, context-specific strategies for mainstreaming circular economy practices in Bangladesh, especially in home appliance sector.

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