

# Circular Economy and Sustainable Development in India: A Study

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## Abstract

In the 21<sup>st</sup> century, developing nations like India face population growth, political strife, rapid urbanisation, food and water scarcity, environmental pollution, infectious diseases and climate change. In this scenario, circular economy (CE) simply makes social and economic sense to make better use of limited resources by building a system to reduce waste and keep items in use for longer periods of time. India is an emerging economy need to focus on the sustainable development to reach the \$5 trillion economy in 2030. The achievement of sustainable development necessitates the implementation of transformative measures and groundbreaking advancements, which must be effectively executed by well-established, sizeable industrial entities. The integration of company development & sustainability is imperative for businesses to flourish, as facilitated by the CE. The present article discusses the principles of CE and Government initiations to build CE and policy frame work to achieve sustainable development in India.

**Keywords:** Circular Economy, Sustainable Development, Principles and Government Initiations

## INTRODUCTION

In a circular economy (CE), components, products and byproducts do not lose much of their value over time. In this system, reduce, reuse and recycle are the fundamental principles rather than manufacturing, use and disposal. Thus, innovations in economy are much needed to avoid the waste, scrap and junk in all sectors at

all levels. According to Schroeder et al. (2019) examines the extent to which CE practices contribute to SDG implementation and establishes the relationship between CE and sustainable development goals (SDGs). The data shows that in 2019, humans discarded 300 million tons of plastic, nearly equal to their weight. By 2050, scientists estimate more plastic than fish in the ocean. Electronic garbage exceeds 50 million tons per year. 1/3<sup>rd</sup> of the food is wasted as results many of hungry people live around the world. Every year, over 100 billion tons of natural resources enter into the economy and more than 60 percent wasted or resulted into greenhouse gas emissions. There are five key sectors i.e., cement, aluminum, steel, plastic and food produce the Greenhouse Gases (GHG) and may affect on the climate crisis [5].

Our world economy is based on a “take-make-waste” model, in which natural resources are taken, used and then thrown away. This inefficient model is pushing our world to the edge, causing the climate crisis and using up the resources we need to build more fair and thriving communities in the future. The exhaustion of nonrenewable resources is accompanied by significant negative effects on both the environment and society; furthermore, the use of resources without proper consideration can leave intricate traces behind. We want to undertake a circular economic system where waste and pollutants are planned out, merchandise and substances final longer and herbal systems can renew. In simple words, CE simply makes social and economic sense to make better use of limited resources by building a system to reduce waste and keep items in use for longer periods of time. According to UN surroundings (Plastic & E-Waste), FAO (food) and Accenture (economic

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possibility), 300 million heaps of Plastic, 50 million heaps of electronic waste and 33% of all food produced is thrown away each year. Those opportunities create the company to suppose innovatively and create goods for recycling, reproduction and reuse. A CE offers a financial opportunity of \$4.05 trillion by reducing waste, growing companies and creates jobs.

## Elements of Circular Economy

The main elements of CE are reduce (waste management), reuse (by products) and recycle (reproduction from waste, scrap and junk). These enable the economy to generate the revenue, effective utilisation of the resources with net zero wastage. The below Fig. depicts the components of CE.

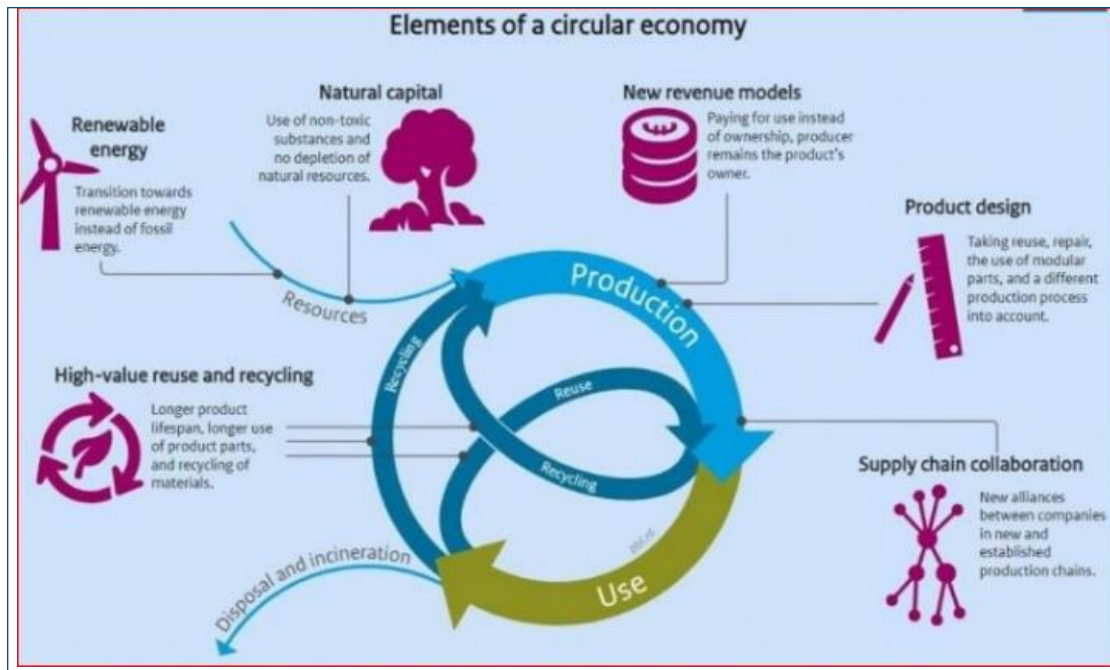


Image source: "Circular Economy: How It Can Contribute to Sustainable Development," 2020.

**Fig. 1: Components of CE**

**Element-1: Reduce – Create a Closed-Loop Ecosystem:** In a CE, waste is virtually non-existent because every byproduct of the use of a product is recycled or used to create a new one. The residual value is produced. Through biological and technological cycles, toxic compounds are removed, waste is split and value is generated. In this approach, it's equally crucial to ensure the excellent quality of the recycled materials as it is to recycle them correctly. The CE is also a key component of meeting quality requirements.

**Element-2: Reuse – Renewable Energy:** Renewable energy (RE) technologies are looked upon favorably to provide for future energy demands and reduce greenhouse gas emissions. The energy used in the CE is RE sources.

**Element-3: Recycle:** The concept of recycling can be categorised as an end-of-pipe approach, whereas the

upstream solutions of a CE aim to tackle potential issues at their source. In addition to recycling, products and materials must be designed to be reused, repaired and remanufactured.

**Building the Circular Economy (CE):** A CE may be build by utilising the natural resources effectively and efficiently through the innovative process and design thinking. Where the manufacturers estimate the wastage in the production and distribute the final products for consumption. Post consumption and waste management is the responsibilities of the corporate, citizens and government for reuse and recycle the wastages for making new products or by products (Srivastav et al., 2023). The below cycle helps to understand the sustainable CE in India.

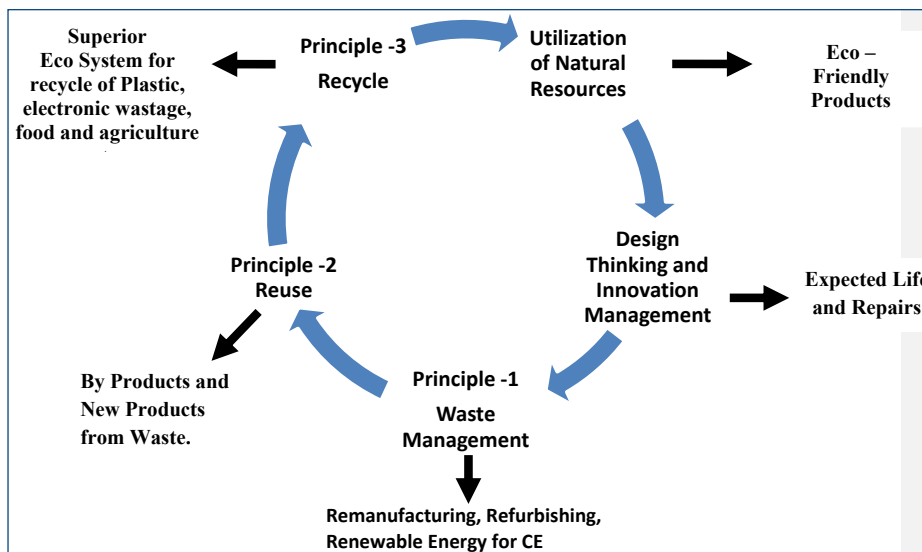


Source: Sustainable Circular Economy in India | IBEF, 2023.

**Fig. 2**

India occupies just 2.4% of the Earth’s surface, but has 140 million people, equal to 18 percent of the world population. A positive, inclusive and sustainable development (SD) model is necessary for India to achieve economic growth alongside a growing population. Circular economies are essential to minimise and reverse the environmental crisis in India due to rapid urbanisation, escalating environmental changes and rapid

population growth. In this approach, minimising resource dependency requires an integrated view of processes and products. This would have a multiplier effect on the economy because it contributes to substantial yield benefits and reduces congestion and pollution. Incentives to help India transition to self-sufficiency can be created by using the sustainable CE approach [11].



**Fig. 3**

### Principles of Circular Economy

Circular economies strive to create a sustainable, regenerative and restorative economic system. All

stakeholders benefit from this approach, which focuses on reducing, reusing, recycling and adding value.

*Principle-1 Waste Management:* Designing products and systems with circularity in mind is the first step towards

a CE. This entails developing closed-loop supply chains that reduce waste and maximise resource efficiency, as well as designing products that are easily disassembled, repaired and reused. Businesses must therefore prioritise the efficient use of natural resources, innovative management techniques and design thinking to forecast product life and waste generation (durability). This facilitates the management of waste for the production of reusable goods and RE.

*Principle-2 Reuse:* Utilising goods and resources over an extended period of time is the second principle of the CE. This can be accomplished using various strategies like remanufacturing, remodeling and repurposing. Businesses can decrease waste, conserve resources and materials and generate new business opportunities by extending the life of their products and materials.

*Principle-3 Recycle:* The third principle of the CE is to bring natural systems back to life by reducing harmful effects on the environment and restoring ecosystems. This can be done by using methods like regenerative agriculture, sustainable forestry and RE. By restoring natural systems, businesses can create new ways to make revenue while also making the world a better place to live.

## THE NATIONAL ACTION PLAN ON CLIMATE CHANGE (NAPCC)

It is a comprehensive strategy formulated by the Government of India to address the challenges of climate change and promote SD. It was launched in June 2008 and outlines various mitigation and adaptation measures to combat climate change impacts across different sectors of the economy. A national strategy is outlined to help India adapt to climate change and enhance its ecological sustainability. Increasing living standards and reducing vulnerability to climate change are dependent on maintaining an Indian economy that grows at a high rate.

The NAPCC consists of eight specific missions, each focusing on a different sector and area of concern.

- *National Solar Mission (NSM):* Government of India and state governments are implementing the NSM to promote sustainable growth and ensure energy security. The goal of the NSM is to make India a global leader in solar energy.
- *National Mission for Enhanced Energy Efficiency:* This mission focuses on improving energy efficiency in various sectors, including industries, buildings and appliances. It aims to reduce energy consumption and greenhouse gas emissions through energy conservation measures and the adoption of energy-efficient technologies.
- *National Mission on Sustainable Habitat:* The mission aims to promote sustainable urban development and improve the energy efficiency of buildings. It encourages the adoption of green building practices and sustainable urban planning.
- *National Water Mission:* This mission focuses on water conservation, water management and increasing water use efficiency to address the challenges of water scarcity and climate change impacts on water resources.
- *National Mission for Sustaining the Himalayan Ecosystem:* The mission aims to protect and preserve the fragile Himalayan ecosystem, which is vulnerable to the impacts of climate change, such as melting glaciers and changing weather patterns.
- *National Mission for a Green India:* This mission focuses on afforestation, reforestation and increasing forest cover to enhance carbon sequestration and promote biodiversity conservation.
- *National Mission for Sustainable Agriculture:* The mission aims to enhance resilience in agriculture by promoting climate-resilient practices, sustainable farming techniques and water conservation in agriculture.
- *National Mission on Strategic Knowledge for Climate Change:* This mission focuses on research, capacity building and knowledge dissemination related to climate change to support informed decision-making and policy formulation.
- The NAPCC represents India's commitment to addressing climate change and aligns with the country's international obligations under the United Nations Framework Convention on Climate Change. Through these missions, India seeks to pursue low-carbon and climate-resilient development pathways while ensuring sustainable economic growth and social welfare.

## BUILDING CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT IN INDIA

Building a CE and promoting SD in India is essential for the country's long-term prosperity and environmental well-being. The primary objective of a CE is to minimise the generation of waste through the prioritisation of renewable resources, the promotion of recycling and reusing of products and materials and the optimisation of resource utilisation. Here are some strategies and initiatives that can help achieve these goals in India:

- *Policy Support:* The Indian government should develop and enforce policies that incentivise CE practices and SD. This may include tax benefits, subsidies and regulations to encourage resource efficiency, recycling and eco-friendly practices.
- *Circular Design and Manufacturing:* Encourage industries to adopt circular design principles to create products that are easier to repair, upgrade and recycle. This approach would reduce waste and extend the lifespan of products, thus minimising the need for new resources.
- *Waste Management and Recycling:* Improve waste management systems to reduce land filling and promote recycling. Encourage the development of recycling facilities and raise awareness among citizens about the importance of waste segregation and responsible disposal.
- *Renewable Energy:* Accelerate the transition to RE sources like solar, wind and hydroelectric power. India has significant potential for RE generation, and investing in these sources will reduce reliance on fossil fuels and curb greenhouse gas emissions.
- *Sustainable Agriculture:* Promote sustainable agricultural practices that prioritise soil health, water conservation and biodiversity preservation. This could include supporting organic farming, agro forestry and efficient irrigation techniques.
- *Eco-Friendly Transport:* Encourage the adoption of electric vehicles and public transportation to reduce the carbon footprint of the transportation sector. Develop infrastructure for electric vehicle charging and invest in sustainable public transportation systems.
- *Green Building and Infrastructure:* Encourage the construction of green buildings that are energy-efficient and use eco-friendly materials. Implement sustainable urban planning principles to create cities and infrastructure that are environmentally friendly.
- *Education and Awareness:* Promote environmental education and awareness campaigns to foster a sense of responsibility towards sustainable practices among citizens, businesses and policymakers.
- *Public-Private Partnerships:* Facilitate collaborations between the government, private sector and NGOs to implement SD projects effectively and efficiently.
- *Circular Business Models:* Support and encourage businesses to adopt circular business models, such as product-as-a-service, sharing economy initiatives and take-back schemes, to promote resource efficiency and waste reduction.
- *Innovation and Research:* Invest in research and development for sustainable technologies and innovations. Encourage startups and entrepreneurs to develop solutions that address environmental challenges.
- *Green Finance:* Encourage financial institutions to prioritise investments in sustainable projects and businesses. Develop green financing mechanisms that reward environmentally responsible initiatives.
- *International Collaboration:* Engage in international collaborations and partnerships to exchange best practices, technologies and knowledge for SD.
- Building a CE and fostering SD in India is a complex and multi-faceted endeavor that requires the collective efforts of the government, businesses, civil society and individuals. By embracing sustainable practices and incorporating CE principles, India can pave the way towards a more resilient and environmentally friendly future.

## REVIEW OF LITERATURE

### Circular Economy

Virmani, Saxena and Raut (2022), Conducted a comprehensive analysis of the obstacles hindering the

implementation of CE practices in micro, small and medium enterprises in India. The study subsequently identified and assessed potential solutions to address these impediments. This study examines a comprehensive range of 31 significant obstacles encountered in the implementation of CE principles. Additionally, it suggests 14 potential solutions based on a thorough analysis of existing literature and expert opinions. The application of the Graph Theory Matrix Approach is utilised in the computation of the comprehensive CE roadblock index. Moreover, the methodologies of fuzzy-SWARA and fuzzy-WASPAS were employed to prioritise the identified solutions and effectively establish a CE.

Sinha (2022), Evaluated the CE for SD using systematic review of literature and explained the circular business strategies (CBS) and its desired outcomes at the firm level. This research work presents CBS as a second-order construct and identifies its firm level enablers and outcomes with the help of seven major enablers and three significant outcomes to CBS. In a recent study conducted by (Munir, Mohaddespour, Nasr & Carter, 2021), an examination was undertaken to assess the present state of waste production, energy insufficiency and waste-to-energy conversion processes. This study examines the issue of municipal solid waste (MSW) in New Zealand, which is generated at a disproportionately high rate per capita. It suggests that adopting a CE approach can effectively address the management of MSW, while also mitigating the growing energy demands associated with converting waste into energy using different MSW-to-energy technologies.

In their study, Kirchherr, Reike and Hekkert (2017), Examined a total of 114 articles pertaining to the concept of CE. Their analysis revealed that CE primarily encompasses a combination of activities aimed at reducing waste, reusing resources and recycling materials. There is a scarcity of studies that have established a clear and direct correlation between corporate entrepreneurship and SD. The studies also fail to address the factors that facilitate the development of creative business models in the context of the CE, as well as the role of conscientious customers in driving this transition.

The concept of the CE can be traced back to various schools of thought, as noted by Ghisellini, Cialani and Ulgiati (2016). The field of CE can trace its origins back

to the realms of economics and ecology. The concept of circularity was derived from the observation of the circular flow of blood within the human body, which operates as a closed-loop system. During the 19<sup>th</sup> century, there was significant progress made in the field of industrial metabolism and the conceptualisation of waste-as-input, as evidenced by the work of Simmonds in 1862. Following the conclusion of the Second World War, there was a remarkable surge in the global economy, accompanied by the emergence of issues over the regulation of pollution and the management of waste (Carter & Rogers, 2008).

During the 1970s, there was a growing interest in environmental movements in both the United States and Europe. This period also witnessed the increasing popularity of the 3R idea, which emphasises the principles of reducing, reusing and recycling (Gertsakis & Lewis, 2003). In order to ensure the long-term viability of human existence on Earth, Boulding (2013) posited the notion of an economy functioning as a closed system, devoid of any material exchange with the external environment, as an unequivocal necessity.

Ghisellini, Cialani and Ulgiati (2016), Introduced the concept of a CE system, which was based on previous scholarly investigations. The beginnings of the concept of the CE can also be attributed to the General Systems Theory, as proposed by Von Bertalanffy (1950). This theory promotes the principles of organisational learning, system thinking, complexity, the development of individuals as valuable assets and holistic thinking, all of which are fundamental aspects of the concept of the CE. MacArthur (2013), The attributes the advancement of the concept of the CE to various contemporary theories, such as the blue economy, performance economy, regenerative design, cradle-to-cradle and biomimicry. The authors Murray, Skene and Haynes (2017), identified several aspects that played a role in shaping the thinking of CE. There exist several studies that investigate the notion of CE, with the prominent ones being the research conducted by MacArthur (2013).

## Sustainable Development

Howarth and Norgaard (2006), finds that the word “sustainability” is used in different ways in different research papers. Some science papers use it mostly to

talk about environmental issues, while others use it to talk about social issues. The term “sustainable development” was first mentioned in Our Common Future (also known as the Brundtland Report) WCED (1987); Murray, Skene and Haynes (2017). The report appealed to international, national- and local-level institutions to encourage economic development that will not damage the stability of the planet and the ability of upcoming generations to utilise Earth’s resources to meet their needs Sneddon.

## GOVERNMENT OF INDIA INITIATIVES TOWARDS CIRCULAR ECONOMY (CE)

The greatest opportunity for developing economies is the rise of consumerism and useful to redefine SD in a way that is appropriate to their context and culture. A fixation on the “industrialization-pollution-remediation cycle” could pose a threat to developing policies that maximise social welfare while concurrently reducing environmental impacts. India as a developing country has huge opportunities to create a SD in CE (Bain, 2010). To create CE and SD, individuals focus on consume less; consume better and systematic change in product utilisation. On the other hand, companies focus on the innovation in products that are based on the principles of CE. This provides green initiatives and green consumerism to bring the new normal of natural ecosystem with less harmful products. The Indian government is actively developing legislation and various incentive schemes to move the country towards a sustainable CE.

Total 11 government committees include NITI Aayog, MoEFCC (Ministry of Environment, Forest and Climate Change), SMEs and industry representatives. To accelerate the CE transition, eleven committees have been constituted. The committees will create a detailed plan to transfer their priority areas to a CE. The committee will also regulate their recommendations and conclusions for efficient execution.

The government aims to accelerate the transition by focusing on 11 areas: municipal solid and liquid waste, scrap metal, electronic waste, lithium-ion batteries, solar panels, gypsum, hazardous industrial waste, used oil waste, agriculture waste, tyre and rubber recycling and end-of-life vehicles.

## Sustainable Environmental Plans

A plan called the National Electric Mobility Mission Plan has been made, and by 2030, at least 30% of all cars in India are supposed to be electric. This plan is meant to improve the country’s fuel security, make transportation cheaper and less harmful to the environment and help the Indian automotive industry become the best in the world at making cars.

## Frame of Inclusive Plan for Climate Change

The NAPCC is India’s comprehensive climate change plan. It also examines greenhouse gas reduction and climate change preparedness. The Pradhan Mantri Fasal Bima Yojana provides crop insurance to farmers facing climate-related droughts and floods.

## Establish National Clean Energy Fund

The National Clean Energy Fund aims to promote the development and use of clean energy technologies in India.

## ESG Norms for Companies

SEBI makes it easier for companies to discuss environmental, social and governance (ESG) success. Efforts are being made to stop green washing. Companies are required to disclose information about their governance structure, practices and policies, as well as their performance and risks. These principles are designed to provide investors with more information about ESG success of a company, so they can make better investment decisions. Businesses will also be able to report and expose their ESG performance through these rules. In the fiscal year 2023–2024, these new rules will go into action. Sovereign Green Bonds will be sold by the Indian government to raise funds for green projects. In addition to these bonds, India will borrow from the market in a larger amount. In order to reduce carbon emissions in the economy, the money will be used to fund public sector projects.

## Effective Waste Management Policy for Sustainable Economic Growth

The government has enacted various regulations aimed at managing plastic waste, among them the plastic trash management rules, e-waste management rules, construction and demolition waste management rules and metals recycling policy. The establishment of these regulations is aimed at attaining sustainable economic growth.

## Implementing the National Solar Mission

The NSM, which seeks to boost India's consumption of solar energy, has been developed to help lessen the country's reliance on fossil fuels. States actively participate in a significant government drive to encourage environmentally friendly growth while resolving India's problems with energy security. The goal of this mission is to position India as a leader in solar energy by establishing the policy framework for its widespread adoption.

## DISCUSSION AND CONCLUSION

At international front, India playing a vital role in controlling climate change and greenhouse gas emission. India has developed policies on waste management, pollution, RE and established clean energy fund, directing the corporate citizens to follow the criteria of ESG and leading international solar alliance at global level. These initiatives are taken way back and looking forward into the SD in India. The study concludes that, CE creates an opportunity for government to build systematic and strategic programs involving all the stakeholders to attain the SD in India. On the other hand, it provides opportunities for business and enterprises to create wealth through by manufacturing the eco-friendly products and process to recycle it.

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