



CIRCULAR ECONOMY AWARENESS AND PRACTICES AMONG COLLEGE STUDENTS: EVIDENCE FROM CHENNAI CITY

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Abstract

This study explores the awareness, attitudes, and practices of college students in Chennai City towards the circular economy, a sustainable model that emphasizes reuse, recycling, repair, and resource efficiency. Based on a sample of 60 respondents selected through simple random sampling, the analysis employed percentage methods, chi-square tests, correlation analysis, and graphical representation to assess behavioral patterns. Findings reveal that while students demonstrate positive attitudes, such as repairing electronic appliances, reusing clothing, and preferring eco-certified products, awareness remains limited, with only 58% recognizing recycling as part of the circular economy. A strong positive correlation ($r = 0.99$) was observed between difficulties in adopting circular practices and the perceived need for government support, highlighting the importance of policy intervention and infrastructure development. Chi-square results further confirmed a significant association between age groups and consideration of environmental impact in purchasing decisions. The study concludes that although students are willing to embrace sustainable practices, effective integration of circular economy principles into education, institutional initiatives, and supportive government policies is essential to translate attitudes into consistent behaviours and foster long-term sustainability.

Keywords: *Circular Economy, Sustainability, College Students, Awareness, Attitudes etc.,*

Introduction

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. These can be productively used again and again, thereby creating further value. This is a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern. This model relies on large quantities of cheap, easily accessible materials and energy. Also part of this model is planned obsolescence, when a product has been designed to have a limited lifespan to encourage consumers to buy it again. The European Parliament has called for measures to tackle this practice.

Meaning of Circular Economy

Circular economy (CE) is currently a popular concept for future sustainable development promoted by the European Union and by several national governments (China, Japan, UK, France, Canada, The Netherlands, Sweden, Finland, etc. Also, many business enterprises around the world have



introduced CE in their manufacturing sectors to shave energy and raw feeding materials. But for the moment the concept of circular economy is a collection of vague ideas from several technological fields and semi-scientific concepts. A report of the European Commission in 2014 estimated that with a Circular Economy type transitions in the EU countries can create 600 billion euros annual economic gains for the EU manufacturing sector alone. Various international economic organizations estimated that the global economy would benefit 1,000 billion US dollars annually. China was the first country in the world, that adopted a law for the circular economy in 2008. The initial concept of materials cycles has been around since the dawn of industrialization and was practiced by industrial businesses because it reduced negative environmental impact, saved in energy consumption and made economic sense. But the linear throughput flow model in industry and other businesses has dominated the overall industrial development causing serious environmental pollution and extensive use of limited natural resources. The Circular Economy approach focused on product, component and material reuse, remanufacturing, refurbishment, repair, cascading and upgrading. Also reduced the energy needs by advocating alternative sources, such as solar, wind, bio mass and waste derived energy utilization throughout the product value chain.

World's Status on Circular Economy

The world is at a critical juncture in its transition towards a circular economy. While significant progress has been made in recent years, the pace of change remains slow, and the scale of transformation required to achieve a truly circular economy is vast. Currently, the global economy is only 9% circular, with the remaining 91% being characterized by a linear “take, make, dispose” approach. However, there are encouraging signs of momentum building, with many countries, companies, and cities committing to circular economy targets and initiatives. For example, the European Union has set a target of becoming carbon neutral by 2050, while China has launched a nationwide initiative to promote circular economy practices. Similarly, companies like IKEA, H&M, and Unilever are pioneering new business models and product designs that prioritize circularity. Cities like Amsterdam, Copenhagen, and Singapore are also leading the way, with innovative urban planning and waste management strategies that showcase the potential of circular economy principles in practice. Despite these successes, significant challenges remain, including the need for greater policy coherence, more robust metrics and standards, and increased investment in circular economy infrastructure and innovation. Nevertheless, as the world continues on its journey towards a more circular and regenerative economy, there is growing optimism that a more sustainable and prosperous future is within reach.

India's Stands on Circular Economy

India, being one of the fastest-growing major economies in the world, is poised to play a significant role in the global transition towards a circular economy. The country has recognized the importance of adopting circular economy principles to achieve sustainable development, reduce waste, and promote resource efficiency. In recent years, the Indian government has taken several initiatives to promote circular economy practices, including the launch of the “Swachh Bharat Abhiyan” (Clean India Mission) and the “Make in India” initiative, which aims to promote sustainable manufacturing practices. Additionally, the government has also introduced policies such as the “Waste Management Rules, 2016” and the “E-Waste Management Rules, 2016” to regulate waste management and promote recycling. Furthermore, India has also set ambitious targets to reduce greenhouse gas emissions and transition to renewable energy sources, which is in line with the principles of a circular economy. Many Indian companies, such as Tata, Mahindra, and Infosys, are



also leading by example, by adopting circular economy practices and investing in sustainable technologies. However, despite these efforts, India still faces significant challenges in its transition towards a circular economy, including inadequate waste management infrastructure, lack of awareness and education, and limited access to financing for circular economy initiatives.

Nevertheless, with its large and growing population, India has the potential to become a global leader in the transition towards a circular economy, and its success in this area will have significant implications for the rest of the world.

Environmental Sustainability

1. Conservation of natural resources: Circular economy promotes the reuse and recycling of materials, reducing the need for extracting and processing raw materials.
2. Reduction of waste and pollution: Circular economy aims to eliminate waste and pollution by designing products and systems that are restorative and regenerative.
3. Climate change mitigation*: Circular economy can help reduce greenhouse gas emissions by promoting the use of renewable energy, reducing energy consumption, and sequestering carbon.

Economic Sustainability

1. Job creation and economic growth: Circular economy can create new job opportunities and stimulate economic growth by promoting innovation, entrepreneurship, and investment in circular businesses.
2. Cost savings and reduced waste disposal costs: Circular economy can help businesses and households reduce costs by minimizing waste generation and promoting the reuse and recycling of materials.
3. Increased competitiveness: Circular economy can enhance competitiveness of businesses by promoting innovation, improving resource efficiency, and reducing environmental impacts

Social Sustainability

1. Improved public health: Circular economy can help improve public health by reducing pollution, promoting sustainable consumption
2. patterns, and increasing access to clean energy and water.
3. Increased social equity: Circular economy can help reduce social inequalities by promoting access to affordable and sustainable products and services, and creating job opportunities in circular industries.
4. Enhanced community engagement and participation: Circular economy can foster community engagement and participation by promoting collaborative consumption, sharing, and reuse of resources.

Key Performance Indicators (KPIs)

1. Material recycling rate: Percentage of materials recycled and reused.
2. Waste reduction rate: Percentage reduction in waste generation.
3. Energy and water efficiency: Reduction in energy and water consumption.
4. Greenhouse gas emissions reduction: Reduction in greenhouse gas emissions.
5. Job creation and economic growth: Number of jobs created and economic growth generated.



Challenges And Limitations

1. Infrastructure and technology limitations: Lack of infrastructure and technology to support circular economy practices.
2. Behavioral change and social norms: Difficulty in changing consumer behaviour and social norms to adopt circular economy practices.
3. Policy and regulatory frameworks: Lack of supportive policy and regulatory framework to promote circular economy practices. Economic and financial constraints: Limited financial resources and economic constraints to invest in circular economy practices.

Statement of the Problem

The world is currently grappling with severe environmental and economic challenges such as climate change, resource depletion, and waste management, making the circular economy a vital solution that promotes sustainable consumption and production patterns; however, its successful transition requires a fundamental shift in individual attitudes and behaviours, and since students represent the future generation of consumers, innovators, and policymakers, this study focuses on analysing their attitudes and distinguishing their behaviors towards circular economy practices, thereby laying the foundation for embedding sustainability into education and ensuring the wider adoption of circular economy principles among the general public in the future.

Literature Review

Jeniffer de Nadae et.al (2022), highlighted that the fashion industry is one of the most important industries for the world economy, but is also one of the most polluting. Some fashion companies have been adopting circular economy initiatives to combat this. Circular fashion (CF) results in cleaner production and reduces textile waste, but depends on consumer collaboration. Several studies analyzing consumer CF issues worldwide have been recently published, but these studies are not common in emerging countries. This paper seeks to investigate the relationships between Brazilian consumers and CF. The methodology comprised a systematic literature review and survey. The main results show that, although young consumers are willing to change their clothing consumption habits and believe that fashion companies should be more sustainable, most of them never get involved in circular actions in the fashion chain.

Kuok Ho Daniel Tang et.al (2023), explained Plastic pollution has received unprecedented attention globally, and there are increasing calls to control it. Despite this, the uptrends of plastic consumption and mismanaged plastic waste show little sign of reversal. This review aims to examine the attitudes of various societal group stewards' plastics to identify the behavioral barriers to reduce plastic pollution and synthesize effective countermeasures. It achieved the aim through content analysis of the most recent literature related to attitudes and behaviors towards plastic pollution, consumption and management, as well as an important emerging theme on plastics recycling ecosystem and economy. It reveals the general negative attitudes of the participants in the studies reviewed towards plastic pollution and their willing attitude to act against it by supporting campaigns, paying for environmentally friendly alternatives and supporting solution-based interventions from governments including policies, regulations and guidelines. Inconvenience due to limited options for plastic items and habits are two main barriers to behavioral changes. This underscores the crucial roles of governments to tap into these attitudes to lead and intensify plastic pollution control through a multi-pronged approach that facilitates systematic substitution of conventional plastics with environmentally friendly alternatives as well as the stepping-up of the circular plastic economy and industrial symbiosis. This review deems that progressively regulated capping of conventional plastic production



and consumption could help the transition, and the public could complement government endeavors through education, mutual influence and awareness-raising which could also be driven by governmental policies and programs.

Scope of the Study

The scope of circular economy aims to build a resource-efficient and sustainable future. To achieve this vision, it is essential to instill circular economy values at the student level, as young learners represent the next generation of consumers, innovators, and policymakers. By embedding awareness, attitudes, and behaviors aligned with circular practices early on, the seeds of sustainability can penetrate deeply into the mindset of the younger generation, fostering long-term adoption of sustainable systems in society.

Objectives of the Study

1. To analyze students' awareness towards the concept of circular economy.
2. To study students' attitudes towards circular economy practices.
3. To examine students' behavior in adopting circular economy principles.

Sample Technique

1. **Method:** Simple random sampling
2. **Sample Size:** 60 respondents
3. **Population:** College students across Chennai city.

Tools of Data Analysis

To measure phenomena and analyze data effectively, the following statistical techniques are employed:

1. Percentage analysis.
2. Chi-square test.
3. Correlation analysis.
4. Graphical representation (**bar charts, pie diagrams, etc.**).

Hypotheses of the Study

Hypothesis I

1. **Null Hypothesis (H_0):** There is no relationship between the level of difficulties in implementing circular economy in day-to-day life and government support in overcoming barriers.
2. **Alternative Hypothesis (H_1):** There is a relationship between the level of difficulties in implementing circular economy in day-to-day life and government support in overcoming barriers.

Hypothesis II

1. **Null Hypothesis (H_0):** There is no significant association between age groups and consideration of environmental impact when making purchasing decisions.
2. **Alternative Hypothesis (H_1):** There is a significant relationship between age groups and consideration of environmental impact when making purchasing decisions

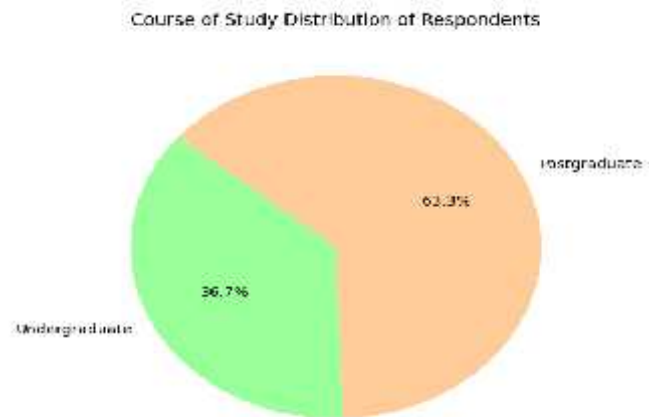
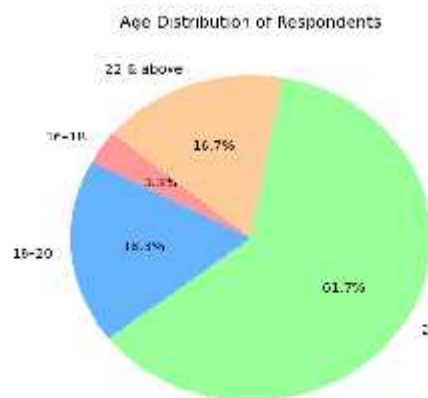


Limitations of the Study

1. The data have been collected to understand the circular economy with special reference to **Chennai city**.
2. The research is restricted to Chennai City, and the results may not be applicable to other regions.
3. The results are based on respondents' opinions, which may involve **biases** or subjective interpretations.

Demographic Profile of Respondents (Total = 60)

Category	Subcategory	No. of Respondents	Percentage
Age Group	16–18	2	3.33%
	18–20	11	18.33%
	20–23	37	61.67%
	22 & above	10	16.67%
Gender	Male	40	66.67%
	Female	20	33.33%
Course of Study	Undergraduate	22	36.67%
	Postgraduate	38	63.33%



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Source: Primary data

Key Insights:

1. Majority (61.67%) are in the 20–23 age group.
2. Two-thirds (66.67%) are male.
3. Most respondents (63.33%) are postgraduate students.



Findings of the Study

On the basic of the analysis carried out, the following findings have been drawn

1. 61% respondents belong to the age group 20–23.
2. 66% respondents are male.
3. 63% respondents are postgraduate students.
4. 58% are aware that recycling materials is part of circular economy.
5. 39% learned about circular economy through mass media (TV, radio, newspaper).
6. 52% stated that their institute is adopting circular economy practices.
7. 40% moderately recommend using old items instead of buying new ones.
8. 50% highly recommend fixing broken items rather than replacing them.
9. 86% fix broken electronic appliances instead of buying new ones.
10. 52% carry their own grocery bags while shopping.
11. 47% rent items (clothes, vehicles) for occasional use instead of buying.
12. 75% use clothes for over five years as a sustainable practice.
13. 62% sometimes lend used items instead of discarding them.
14. 64% use reusable bottles instead of disposable ones.
15. 63% sometimes reuse or recycle items by changing their function.
16. 49% consider environmental impact before buying products.
17. 61% prefer products with eco-certifications.
18. 51% choose products with minimal packaging.
19. 54% believe government support is not essential, citing self-awareness.
20. 44% face challenges such as limited infrastructure, high costs, and lack of technology.
21. 58% report high difficulties in implementing circular economy.

Correlation Test

1. Null Hypothesis (H_0): There is no relationship between the level of difficulties in implementing circular economy in day-to-day life and government support in overcoming barriers.
2. Alternative Hypothesis (H_1): There is a relationship between the level of difficulties in implementing circular economy in day-to-day life and government support in overcoming barriers.

Correlation Analysis Table

Statistic / Step	Value
$\sum X^2$ (Sum of squares of X)	4262
$\sum Y^2$ (Sum of squares of Y)	4584
$\sum XY$ (Sum of product of X and Y)	4410
Formula	$r = \frac{\sum XY}{\sqrt{\sum X^2 \cdot \sum Y^2}}$
Substitution	$r = \frac{4410}{\sqrt{4262 \times 4584}}$
Denominator	4420.068
Correlation Coefficient (r)	0.99
Result	Highly Positive Correlation



Inference

Since the calculated correlation coefficient $r = 0.99$, which is very close to +1, it indicates a strong positive relationship between the level of difficulties in implementing circular economy in day-to-day life and the need for government support in overcoming barriers.

This means

1. Respondents who face greater difficulties in adopting circular economy practices are also those who emphasize the importance of government intervention.
2. The findings highlight that government support (infrastructure, policy, incentives) is crucial to reduce barriers and enable smoother adoption of circular economy principles among students and society.

Chi-Square Test: Age Group vs. Environmental Impact Consideration

1. Null Hypothesis (H_0): No association between age group and consideration of environmental impact in purchasing decisions.
2. Alternative Hypothesis (H_1): There is an association between age group and consideration of environmental impact in purchasing decisions.
3. Calculated $\chi^2 = 23.899$
4. Degrees of Freedom = 6
5. Table Value @ 5% significance = 12.592
6. Since $23.899 > 12.592 \rightarrow$ Reject H_0 , Accept H_1

Inference: There is a significant association between age group and consideration of environmental impact when making purchasing decisions.

Suggestions

1. Curriculum Integration: Embed circular economy principles into coursework through projects and case studies.
2. Waste Audits: Conduct audits in institutions to identify areas for improvement.
3. Design Thinking: Apply creative problem-solving to reduce waste and optimize resources.
4. Educational Campaigns: Organize workshops and awareness drives on circular economy benefits.
5. Research & Innovation: Encourage student-led research on sustainable technologies and practices.

Conclusion

This study provides valuable insights into the attitudes and behaviours of students in Chennai towards circular economy. While students show a positive attitude and willingness to adopt sustainable practices, gaps remain in their knowledge and practical application.

Educational institutions can play a pivotal role in shaping these behaviours by integrating sustainability into learning and campus practices. Policymakers and businesses can also leverage these findings to design initiatives that support youth-driven sustainability. Ultimately, this study demonstrates that students in Chennai are eager to adopt circular economy practices, but require education, support, and infrastructure to make sustainable choices a reality.



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