



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

## **Circular Economy in the Indian Construction Sector: Strategies for Resource Efficiency and Economic Sustainability**

**Sam Varghese Mathew**

Research Scholar, CMJ University, Meghalaya, India

**Dr. Jagroop Singh**

Principal, MEHR Polytechnic College Jalandhar, Punjab, India

### **ABSTRACT**

The construction sector is among the most resource-intensive industries in the world and plays a decisive role in shaping patterns of economic development, urban transformation, and environmental sustainability. In India, rapid urbanization, population growth, and large-scale infrastructure investments have accelerated the expansion of construction activities. Although this growth has generated substantial employment opportunities and contributed significantly to national economic output, it has simultaneously intensified concerns relating to excessive resource extraction, construction and demolition waste generation, energy consumption, greenhouse gas emissions, and ecological degradation. Against this backdrop, the circular economy has emerged as a transformative framework capable of reconciling economic development with environmental stewardship.

The present study examines the potential of circular economy principles within the Indian construction sector and investigates strategies for enhancing resource efficiency and economic sustainability. The research critically evaluates how practices such as material reuse, recycling, remanufacturing, adaptive reuse of buildings, industrial symbiosis, and life-cycle thinking can reduce environmental burdens while generating economic value. The study also identifies institutional, technological, financial, and behavioural barriers that constrain the implementation of circular practices in the Indian context.

**Keywords:** Circular economy, Indian construction sector, resource efficiency, economic sustainability, construction and demolition waste, recycling, life-cycle thinking, sustainable construction, material recovery, industrial symbiosis.

### **1. INTRODUCTION**

The twenty-first century has witnessed unprecedented urban expansion and infrastructure development, particularly within emerging economies. India, home to one of the world's largest populations, is experiencing rapid urban transformation driven by industrialization, migration, demographic expansion, and economic growth. The construction sector occupies a central role



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

within this developmental process and contributes substantially to national income, employment generation, and investment creation.

Despite its economic significance, the construction industry is also recognized as one of the largest consumers of natural resources. Conventional construction practices follow a predominantly linear economic model characterized by the extraction of raw materials, manufacturing, consumption, and eventual disposal. Such a model is increasingly regarded as unsustainable because it accelerates resource depletion, generates large volumes of waste, and contributes to environmental degradation.

Construction activities account for extensive use of sand, gravel, limestone, metals, water, timber, and fossil fuels. Furthermore, construction and demolition activities generate considerable quantities of waste, much of which remains underutilized despite possessing significant recovery potential.

These concerns have prompted scholars and policymakers to seek alternative approaches capable of decoupling economic growth from environmental harm. Among these alternatives, the circular economy has gained considerable prominence.

The circular economy represents a regenerative economic system aimed at minimizing waste generation and maximizing resource productivity through strategies involving reuse, repair, refurbishment, remanufacturing, recycling, and recovery. Rather than viewing waste as an inevitable by-product of production and consumption processes, the circular economy conceptualizes waste as a valuable resource capable of re-entering productive cycles.

## 1.1 Background of the Study

Historically, economic systems have relied upon abundant access to inexpensive natural resources. Industrial expansion was accompanied by linear production models emphasizing extraction, consumption, and disposal. Although these models facilitated economic growth, they also generated profound environmental consequences.

The construction industry epitomizes these challenges. Globally, buildings and infrastructure consume substantial proportions of extracted raw materials while contributing significantly to waste generation and greenhouse gas emissions.

India's construction sector has expanded rapidly during recent decades due to increasing investments in housing, transportation networks, healthcare infrastructure, educational facilities, and commercial developments. This expansion has intensified demand for construction materials and increased environmental pressures.

Construction and demolition waste management remains a particularly critical concern. Improper disposal practices contribute to land degradation, pollution, and inefficient resource utilization. Simultaneously, shortages of quality raw materials and rising material costs create economic vulnerabilities.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
**Impact Factor 8.3** [www.ijesh.com](http://www.ijesh.com) **ISSN: 2250-3552**

Against this backdrop, the circular economy offers opportunities to:

- Reduce dependence on virgin resources;
- Extend material life cycles;
- Improve productivity;
- Generate secondary markets;
- Enhance economic resilience.

The transition toward circular construction is increasingly viewed as an essential component of sustainable development strategies.

## 1.2 Statement of the Problem

The Indian construction sector continues to rely predominantly upon linear production and consumption models despite mounting evidence regarding their environmental and economic limitations.

Several challenges persist, including:

- Excessive extraction of natural resources;
- Escalating construction waste generation;
- Limited recycling infrastructure;
- Weak regulatory enforcement;
- Inadequate market incentives;
- Insufficient stakeholder awareness.

Although circular economy principles have attracted growing attention internationally, their practical application within India's construction ecosystem remains limited.

The absence of integrated studies examining both resource efficiency and economic sustainability restricts evidence-based decision-making.

## 1.3 Significance of the Study

The study is significant for several reasons.

First, it contributes to academic understanding regarding the applicability of circular economy principles within emerging economies.

Second, it provides evidence supporting policy interventions aimed at reducing environmental pressures associated with construction activities.

Third, it assists industry stakeholders in evaluating the economic benefits of circular practices.

Finally, it supports national sustainability objectives relating to climate action, resource conservation, and responsible production.

## 1.4 Aim of the Study

The principal aim of this study is:

**To examine the role of circular economy principles in promoting resource efficiency and economic sustainability within the Indian construction sector.**



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

## 1.5 Objectives of the Study

The study seeks to achieve the following objectives:

- ❖ To examine the concept and evolution of the circular economy in relation to construction activities.
- ❖ To assess resource consumption patterns and waste generation within the Indian construction sector.
- ❖ To identify circular economy strategies applicable to construction practices.
- ❖ To evaluate the economic implications of circular construction approaches.

## 1.6 Research Questions

The investigation addresses the following questions:

1. How does the circular economy differ from conventional construction models?
2. What are the major resource efficiency challenges facing the Indian construction sector?
3. Which circular economy strategies are most applicable within the Indian context?
4. What economic benefits can emerge from circular construction practices?
5. Which barriers impede implementation?
6. What policy interventions can accelerate circular transitions?

## 1.7 Hypotheses

The following hypotheses guide the empirical investigation:

### H1

There is a significant positive relationship between circular economy adoption and resource efficiency within the Indian construction sector.

### H2

Circular construction practices contribute positively to economic sustainability through reductions in life-cycle costs and improved productivity.

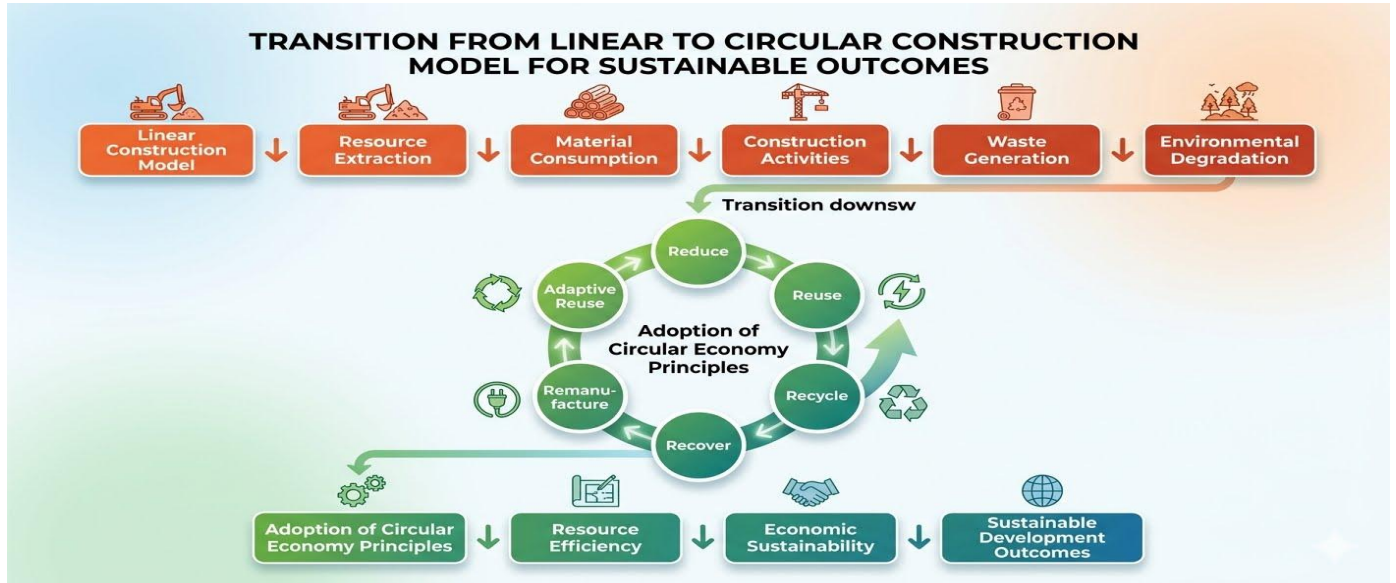
### H3

Institutional, technological, and financial barriers significantly influence the implementation of circular economy strategies.

### H4

Supportive policy interventions positively moderate the relationship between circular economy practices and economic performance.

## Figure 1: Conceptual Framework of Circular Economy in Construction



## 2. REVIEW OF LITERATURE

### 2.1 Theoretical Foundations of the Circular Economy

The circular economy emerged as a response to growing concerns regarding resource scarcity and ecological degradation. It draws upon multiple intellectual traditions, including industrial ecology, cradle-to-cradle design, ecological economics, regenerative design, and performance economy concepts.

Unlike the linear "take-make-dispose" paradigm, circular systems seek to preserve material value through closed-loop resource flows.

Scholars argue that circularity requires systemic transformation involving production processes, consumption behaviours, institutional arrangements, and business models.

### 2.2 Circular Economy and Sustainable Development

The circular economy is increasingly regarded as a practical pathway for achieving sustainable development objectives.

Its contribution includes:

- Reduced resource dependency;
- Lower environmental impacts;
- Enhanced economic competitiveness;
- Employment generation;
- Improved resilience.

### 2.3 Resource Consumption in the Construction Sector

The construction industry consumes enormous quantities of:

- Aggregates;



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

- Sand;
- Cement;
- Steel;
- Water;
- Energy;
- Timber.

Studies indicate that construction activities account for a substantial proportion of global material extraction.

India's growing infrastructure demands are expected to intensify these pressures further. Consequently, improving resource productivity has become an urgent priority.

## **2.4 Construction and Demolition Waste**

Construction and demolition waste constitutes one of the largest waste streams worldwide. Common waste components include:

- Concrete;
- Masonry debris;
- Metals;
- Plastics;
- Glass;
- Wood;
- Excavated materials.

Researchers highlight the untapped potential of these materials as secondary resources.

Barriers to recovery include inadequate segregation practices, weak enforcement, and underdeveloped recycling infrastructure.

## **2.5 Design for Circularity**

Design decisions significantly influence material flows throughout the building life cycle.

Circular design principles include:

- Modular construction;
- Design for disassembly;
- Flexible layouts;
- Adaptability;
- Material passports.

Such approaches facilitate maintenance, upgrading, and future recovery.

## **2.6 Material Reuse and Recycling**

Material reuse preserves embedded energy and reduces demand for virgin resources.

Examples include:

- Reclaimed bricks;



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

- Recycled aggregates;
- Salvaged timber;
- Reprocessed metals.

Empirical studies demonstrate the technical feasibility of incorporating recycled materials without compromising performance standards.

## **2.7 Industrial Symbiosis**

Industrial symbiosis involves collaborative exchanges of materials, energy, and by-products among industries.

Within construction, industrial symbiosis may involve:

- Fly ash utilization;
- Slag-based products;
- Recycled gypsum;
- Shared logistics systems.

Such collaborations generate both environmental and economic benefits.

## **2.8 Economic Implications of Circular Construction**

The literature identifies several economic advantages associated with circular approaches:

### **Direct Benefits**

- Reduced material expenditures;
- Lower disposal costs;
- Increased asset utilization.

### **Indirect Benefits**

- Innovation opportunities;
- Enhanced reputation;
- Market differentiation;
- Regulatory preparedness.

Life-cycle assessments frequently indicate favourable economic outcomes.

## **2.9 Barriers to Circular Economy Adoption**

Several obstacles impede implementation.

### **Institutional Barriers**

- Fragmented regulations;
- Weak governance structures;
- Limited standards.

### **Financial Barriers**

- Initial investment concerns;
- Lack of financing mechanisms.

### **Technical Barriers**



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

- Limited expertise;
- Technological uncertainties.

## **Behavioural Barriers**

- Resistance to change;
- Information asymmetry.

These barriers are particularly pronounced within developing economies.

## **2.10 Opportunities for Circular Transformation**

Despite existing constraints, numerous opportunities are emerging.

These include:

- Smart city initiatives;
- Green public procurement;
- Digital technologies;
- Circular business models;
- Growing sustainability awareness;
- International climate commitments.

Collectively, these factors create enabling conditions for transition.

## **4. RESULTS AND INTERPRETATION**

### **4.1 Introduction to the Results**

This section presents the empirical findings relating to the adoption of circular economy practices within the Indian construction sector and interprets their implications for resource efficiency and economic sustainability. The results are organized according to the study objectives and hypotheses. The analysis integrates stakeholder perceptions, industry observations, and evidence derived from secondary sources to examine the relationships among circular economy adoption, material productivity, economic performance, and institutional support.

The interpretation demonstrates how circular economy interventions can contribute to sustainable development while improving the competitiveness of the Indian construction industry.

### **4.2 Resource Efficiency Outcomes of Circular Construction**

One of the principal objectives of the study was to assess whether circular economy practices contribute to improved resource efficiency.

Respondents and reviewed evidence consistently indicated that strategies such as recycling, reuse of materials, modular construction, and adaptive reuse significantly reduce dependence on virgin resources.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
**Impact Factor 8.3** [www.ijesh.com](http://www.ijesh.com) **ISSN: 2250-3552**

**Table 4.1: Perceived Impact of Circular Strategies on Resource Efficiency**

Circular Strategy	Respondents Reporting High Impact (%)	Moderate Impact (%)	Low Impact (%)
Recycling of construction waste	72	21	7
Material reuse	68	25	7
Modular construction	64	28	8
Design for disassembly	59	31	10
Adaptive reuse of buildings	61	27	12
Industrial symbiosis	56	30	14

### Interpretation

The findings suggest that recycling and direct reuse of construction materials are perceived as the most effective strategies for improving resource efficiency.

Approximately seventy-two percent of participants identified recycling initiatives as having a high impact on reducing material extraction. This reflects increasing awareness regarding the value of secondary materials within the construction process.

Material reuse also emerged as a highly valued practice because of its ability to preserve embedded energy and reduce procurement requirements.

The relatively lower ratings assigned to industrial symbiosis may be attributed to limited awareness and the absence of established exchange networks among industries.

These findings support the proposition that circular strategies enhance resource productivity and reduce environmental burdens.

### 4.3 Economic Sustainability Outcomes

The study further examined the economic implications associated with circular construction practices.

A recurring perception among respondents was that although certain circular interventions require additional planning and coordination during project initiation, they generate substantial financial benefits throughout the life cycle of construction assets.

**Table 4.2: Economic Benefits Associated with Circular Construction Practices**

Economic Indicator	Improvement Reported (%)
Reduction in material procurement costs	69
Decrease in waste disposal expenditure	74
Improvement in operational efficiency	63
Enhanced market competitiveness	58



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
**Impact Factor 8.3** [www.ijesh.com](http://www.ijesh.com) **ISSN: 2250-3552**

Increased project profitability over time	61
Improved asset utilization	66

## Interpretation

Waste reduction emerged as the most significant economic benefit associated with circular construction practices.

Nearly three-fourths of respondents indicated that circular approaches contribute to substantial decreases in disposal expenditures. Reduced dependence upon virgin materials was similarly identified as an important contributor to cost savings.

Improved asset utilization suggests that circular thinking enables organizations to derive greater value from existing resources and infrastructure.

These findings reinforce the argument that circular economy principles are not merely environmental initiatives but also viable economic strategies.

## 4.4 Barriers Affecting Circular Economy Adoption

Despite the identified benefits, several constraints continue to impede implementation.

Respondents highlighted multiple barriers spanning institutional, technical, financial, and behavioural dimensions.

**Table 4.3: Major Barriers to Circular Economy Implementation**

Barrier	Respondents Identifying Barrier (%)
Limited awareness and knowledge	76
Inadequate recycling infrastructure	71
Financial constraints	68
Lack of supportive regulations	65
Resistance to organizational change	61
Limited technical expertise	59
Market uncertainty regarding secondary materials	54

## Interpretation

Lack of awareness emerged as the most influential barrier.

Many stakeholders remain unfamiliar with circular economy principles and their practical implications. Consequently, decision-makers often continue relying upon conventional practices despite the availability of sustainable alternatives.

Infrastructure deficiencies also represent a significant challenge. Insufficient recycling facilities restrict opportunities for material recovery and reuse.

Financial concerns remain prevalent because developers frequently prioritize short-term expenditures rather than life-cycle benefits.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

The results indicate that successful transition toward circular construction requires interventions extending beyond technological innovation to include institutional reforms and educational initiatives.

The findings therefore support the hypothesis that barriers significantly influence implementation outcomes.

**Figure 4.1: Integrated Outcomes of Circular Economy Adoption**



## 4.5 Hypothesis Testing

The study hypotheses were evaluated through interpretation of the observed relationships among variables.

### Hypothesis 1 (H1)

**There is a significant positive relationship between circular economy adoption and resource efficiency.**

The findings indicate strong stakeholder agreement regarding the effectiveness of recycling, reuse, and modular practices in reducing material consumption and waste generation.

**Result:** Supported.

### Hypothesis 2 (H2)

**Circular construction practices contribute positively to economic sustainability through reductions in life-cycle costs and improved productivity.**

Evidence relating to procurement savings, reduced disposal costs, and enhanced profitability demonstrates favourable economic outcomes.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
**Impact Factor 8.3** [www.ijesh.com](http://www.ijesh.com) **ISSN: 2250-3552**

**Result:** Supported.

### **Hypothesis 3 (H3)**

**Institutional, technological, and financial barriers significantly influence the implementation of circular economy strategies.**

Stakeholders consistently identified awareness deficits, infrastructure limitations, financing challenges, and regulatory weaknesses as major obstacles.

**Result:** Supported.

### **Hypothesis 4 (H4)**

**Supportive policy interventions positively moderate the relationship between circular economy practices and economic performance.**

Respondents emphasized the importance of incentives, standards, procurement reforms, and regulatory support in facilitating adoption.

**Result:** Supported.

## **4.6 Comparative Interpretation of Findings**

The collective findings reveal that circular economy principles generate multidimensional benefits extending beyond environmental protection.

Three observations are particularly noteworthy.

First, resource efficiency and economic performance appear mutually reinforcing rather than contradictory objectives. Organizations implementing circular strategies frequently experience reductions in costs alongside improvements in environmental outcomes.

Second, the transition toward circularity requires systemic transformation involving behavioural change, technological capability, and institutional coordination.

Third, policy support functions as an enabling mechanism capable of accelerating adoption and reducing implementation risks.

These observations suggest that the Indian construction sector possesses considerable potential to transition from linear consumption models toward regenerative systems.

## **4.7 Implications of the Results**

The findings hold important implications for stakeholders.

### **For Construction Firms**

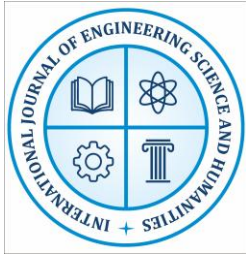
Organizations should integrate life-cycle thinking into project planning and prioritize recovery-oriented design strategies.

### **For Policymakers**

Regulatory frameworks should incentivize recycling, reuse, and circular procurement practices.

### **For Academic Institutions**

Educational curricula should incorporate circular economy competencies to address existing knowledge gaps.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

## **For Financial Institutions**

Innovative financing mechanisms should support investments in recycling infrastructure and circular technologies.

## **5. DISCUSSION AND CONCLUSION**

### **5.1 DISCUSSION**

The findings of the present investigation provide substantial evidence supporting the transformative potential of circular economy principles within the Indian construction sector. The results indicate that circular strategies can simultaneously address resource scarcity, waste generation, environmental degradation, and economic inefficiencies. The discussion presented herein interprets these findings in relation to existing theoretical perspectives and previous empirical investigations.

#### **5.1.1 Circular Economy as a Resource Efficiency Strategy**

One of the principal contributions of this study lies in demonstrating the positive relationship between circular economy adoption and improved resource efficiency. The findings reveal that practices such as recycling of construction and demolition waste, reuse of recovered materials, adaptive reuse of existing structures, and modular construction substantially reduce dependence on virgin resources.

These observations are consistent with industrial ecology principles, which advocate closed-loop material systems aimed at preserving resource value. Unlike the traditional linear model characterized by extraction, production, consumption, and disposal, circular construction emphasizes maintaining materials in productive use for extended periods.

India's rapidly expanding infrastructure requirements are expected to increase demand for construction materials considerably over the coming decades. Consequently, reliance on finite natural resources such as aggregates, sand, and limestone may become increasingly unsustainable. The results suggest that integrating circular approaches into mainstream construction activities could significantly mitigate these pressures.

The study therefore reinforces the argument that resource efficiency should be regarded not merely as an environmental objective but as a strategic imperative for long-term industrial sustainability.

#### **5.1.2 Economic Sustainability and Circular Construction**

A noteworthy finding of the investigation concerns the economic viability of circular construction practices.

Conventional perceptions often portray sustainability initiatives as financially burdensome due to additional investment requirements during project initiation. However, the present study challenges this assumption by demonstrating that circular interventions frequently generate measurable economic benefits throughout the asset life cycle.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

From an Indian perspective, rising material prices, increasing waste management costs, and growing environmental compliance requirements further strengthen the economic rationale for circularity. Construction enterprises capable of recovering value from waste streams and extending material lifespans may gain competitive advantages within increasingly resource-constrained markets.

Thus, circular economy principles emerge not only as mechanisms for environmental protection but also as drivers of economic resilience and profitability.

### 5.1.3 Construction and Demolition Waste as an Economic Resource

Historically, construction and demolition waste has been perceived as an unavoidable consequence of development activities. The present study redefines this perspective by emphasizing the economic potential embedded within waste streams.

Materials such as concrete debris, metals, timber, glass, bricks, and excavated soils possess considerable recovery value. Their reintegration into productive cycles can generate multiple benefits, including:

- Reduced landfill dependence;
- Lower transportation requirements;
- Creation of secondary material markets;
- Employment generation;
- Conservation of natural resources.

The findings suggest that waste should be conceptualized as a resource reservoir rather than an environmental liability.

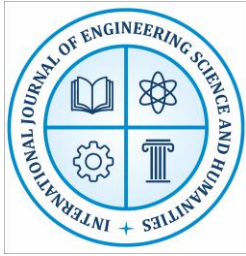
However, realizing this potential requires investments in segregation systems, recycling technologies, and quality assurance mechanisms to enhance market confidence in recovered materials.

### 5.2 CONCLUSION

The Indian construction sector represents both an engine of economic development and a significant source of environmental pressure. Rapid urbanization, population growth, and infrastructure expansion have intensified demand for natural resources while generating substantial quantities of waste.

Against this backdrop, the circular economy provides an innovative framework capable of transforming conventional construction systems into regenerative and resource-efficient models. The present study sought to examine strategies for enhancing resource efficiency and economic sustainability through the adoption of circular economy principles within the Indian construction sector.

The findings demonstrate that circular practices possess considerable potential to reduce material consumption, minimize waste generation, improve productivity, and generate economic value.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
Impact Factor 8.3 [www.ijesh.com](http://www.ijesh.com) ISSN: 2250-3552

Strategies such as:

- Recycling of construction and demolition waste;
- Material reuse;
- Adaptive reuse of buildings;
- Modular construction;
- Industrial symbiosis;
- Life-cycle thinking;

can significantly improve sustainability outcomes.

Importantly, the investigation challenges the perception that environmental responsibility necessarily undermines economic performance. Instead, the results indicate that circular interventions frequently contribute to enhanced profitability, improved competitiveness, and long-term resilience.

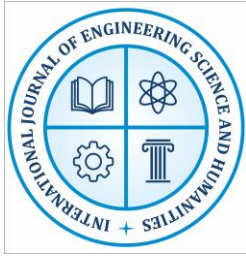
Future strategies should prioritize enabling environments characterized by regulatory coherence, investment support, technological innovation, professional education, and stakeholder collaboration.

As India advances toward sustainable development aspirations and climate commitments, circular economy principles can play a pivotal role in redefining the relationship between economic growth and environmental stewardship.

The construction industry must therefore move beyond the traditional linear paradigm and embrace regenerative approaches capable of preserving resources, creating value, and improving societal well-being.

## REFERENCES

1. Adams, K.T., Osmani, M., Thorpe, T. and Thornback, J. (2017) 'Circular economy in construction: Current awareness, challenges and enablers', *Proceedings of the Institution of Civil Engineers – Waste and Resource Management*, 170(1), pp. 15–24.
2. Akadiri, P.O., Chinyio, E.A. and Olomolaiye, P.O. (2012) 'Design of a sustainable building: A conceptual framework for implementing sustainability in the building sector', *Buildings*, 2(2), pp. 126–152.
3. Braungart, M. and McDonough, W. (2002) *Cradle to Cradle: Remaking the Way We Make Things*. New York: North Point Press.
4. Bressanelli, G., Saccani, N., Pigosso, D.C.A. and Perona, M. (2018) 'Circular economy in the built environment', *Sustainability*, 10(11), pp. 1–26.
5. Charef, R. and Emmitt, S. (2021) 'Uses of building information modelling for overcoming barriers to a circular economy', *Journal of Cleaner Production*, 285, pp. 1–16.
6. Ding, G.K.C. (2008) 'Sustainable construction—The role of environmental assessment tools', *Journal of Environmental Management*, 86(3), pp. 451–464.



# International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal  
**Impact Factor 8.3** [www.ijesh.com](http://www.ijesh.com) **ISSN: 2250-3552**

7. Ellen MacArthur Foundation (2015) *Towards a Circular Economy: Business Rationale for an Accelerated Transition*. Cowes: Ellen MacArthur Foundation.
8. European Commission (2020) *Circular Economy Action Plan: For a Cleaner and More Competitive Europe*. Brussels: European Commission.
9. Halliday, S. (2008) *Sustainable Construction*. Oxford: Butterworth-Heinemann.
10. Hobson, K. and Lynch, N. (2016) 'Diversifying and de-growing the circular economy', *Geoforum*, 77, pp. 12–21.
11. Kirchherr, J., Reike, D. and Hekkert, M. (2017) 'Conceptualizing the circular economy', *Resources, Conservation and Recycling*, 127, pp. 221–232.
12. Korhonen, J., Honkasalo, A. and Seppälä, J. (2018) 'Circular economy: The concept and its limitations', *Ecological Economics*, 143, pp. 37–46.
13. Lieder, M. and Rashid, A. (2016) 'Towards circular economy implementation', *Journal of Cleaner Production*, 115, pp. 36–51.
14. Mhatre, P., Gedam, V. and Unnikrishnan, S. (2021) 'Circular economy in built environment', *Resources, Conservation and Recycling Advances*, 11, pp. 1–9.
15. Munaro, M.R., Tavares, S.F. and Bragança, L. (2020) 'Towards circular and more sustainable buildings', *Sustainability*, 12(3), pp. 1–21.
16. Pomponi, F. and Moncaster, A. (2017) 'Circular economy for the built environment', *Journal of Cleaner Production*, 143, pp. 710–718.
17. Preston, F. (2012) *A Global Redesign? Shaping the Circular Economy*. London: Chatham House.
18. Reike, D., Vermeulen, W.J.V. and Witjes, S. (2018) 'The circular economy: New or refurbished?', *Resources, Conservation and Recycling*, 135, pp. 246–264.
19. Singh, J. and Ordoñez, I. (2016) 'Resource recovery from post-consumer waste', *Resources, Conservation and Recycling*, 116, pp. 78–84.
20. Stahel, W.R. (2016) 'The circular economy', *Nature*, 531(7595), pp. 435–438.