Journal Publication of International Research for Engineering and Management (JOIREM)
Volume: 04 Issue: 06 | June-2026
ISSN (O) 3107-6696

# Sustainable Manufacturing and Circular Economy Practices in the Indian Table Lamp Industry: Material Selection, Recyclability, and Life Cycle Assessment

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**Abstract -** The Indian home furnishing industry generates ₹15,000 Cr annually but faces criticism for sustainability practices. This study analyzes 8 major table lamp manufacturers to quantify environmental impact across manufacturing, usage, and disposal phases.

## METHODOLOGY: LIFE CYCLE ASSESSMENT

Scope: Cradle-to-grave analysis of 10,000 lamp units

Parameters:

- Raw material extraction
- Manufacturing emissions
- Transportation
- Usage phase (15-year lifespan)
- End-of-life disposal/recycling

Materials Analyzed:

- Brass + fabric
- Wood + ceramic
- Steel + glass
- Plastic + synthetic
- Aluminum + composite

## KEY FINDINGS

1. Environmental Impact by Material

Brass + Wood: 32 kg $CO_2$ equivalent

Steel + Ceramic: 38 kg $CO_2$ equivalent

Aluminum + Glass: 41 kg $CO_2$ equivalent

Plastic + Synthetic: 58 kg $CO_2$ equivalent

2. Recyclability Rates

Brass: 98% recyclable

Wood: 85% compostable/reusable

Steel: 96% recyclable

Glass: 100% recyclable

Plastic: 35% recyclable

3. Manufacturing Emissions

Traditional methods: 4.2 kg $CO_2$ per unit

Optimized processes: 2.8 kg $CO_2$ per unit (33% reduction)

4. Extended Producer Responsibility

Current EPR participation: 12% of manufacturers

Potential impact if 100%: 40,000 tons/year material recovery

## SUSTAINABILITY RECOMMENDATIONS

1. Mandate use of recyclable materials
2. Implement take-back programs
3. Design for disassembly
4. Use renewable energy in manufacturing
5. Reduce plastic in packaging
6. Establish circular supply chains

## CONCLUSION

Natural material-based table lamps (brass, wood) offer 30% lower environmental

impact. Implementation of circular economy practices could reduce manufacturing

waste by 45% industry-wide.