



RIS

Research and Information System
for Developing Countries

विकासशील देशों की अनुसंधान एवं सूचना प्रणाली



INDIA
BRAZIL
SOUTH AFRICA
FORUM

IBSA COOPERATION IN ENVISAGING A CIRCULAR ECONOMY FOR SUSTAINABLE DEVELOPMENT IN HOSPITAL WASTE MANAGEMENT

Dr Savitha K L

IBSA Fellow

Research Information System for Developing Countries, New Delhi

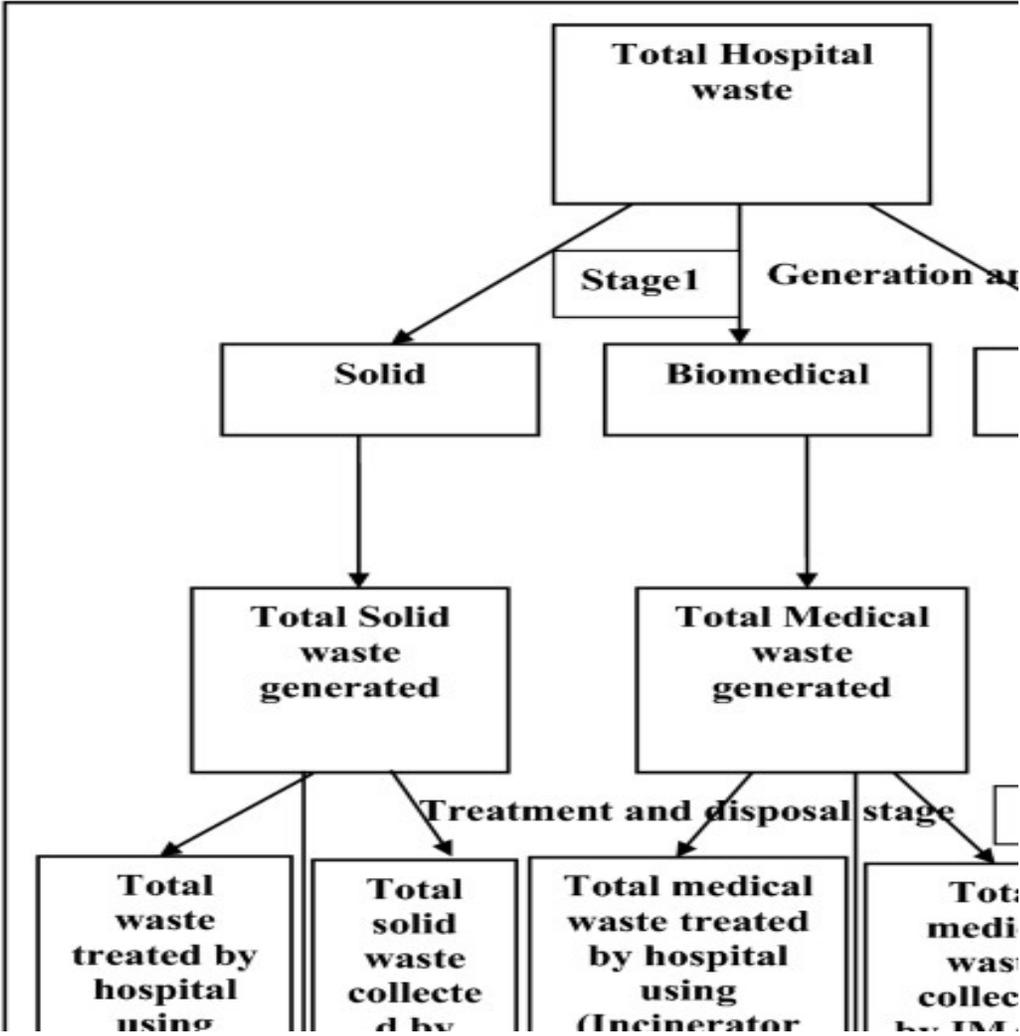
Assistant Professor in Economics (CHRIST University Bangalore)

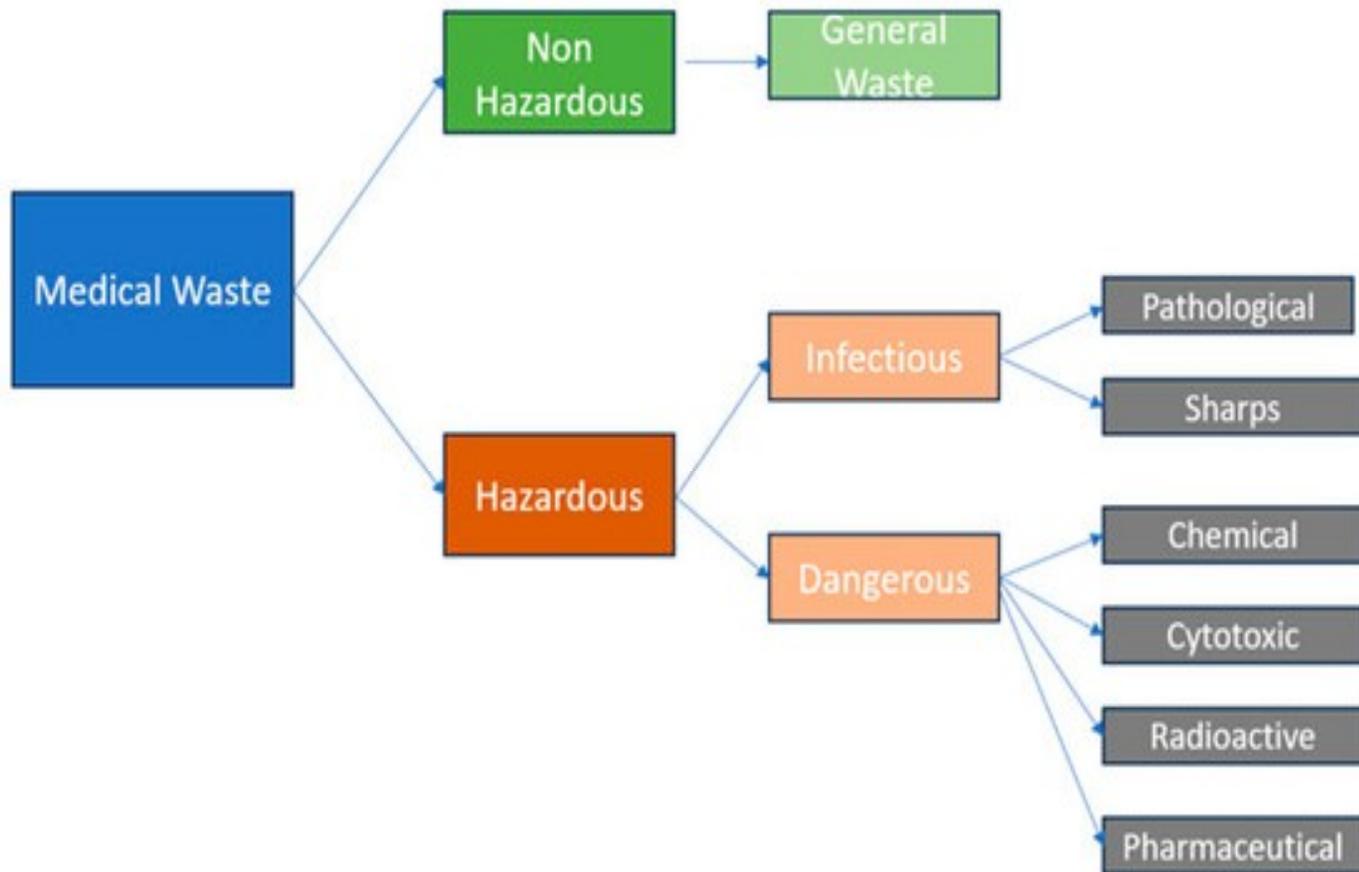
Date: 08-12-2025

Introduction

Existing Problems in Hospital Waste Management

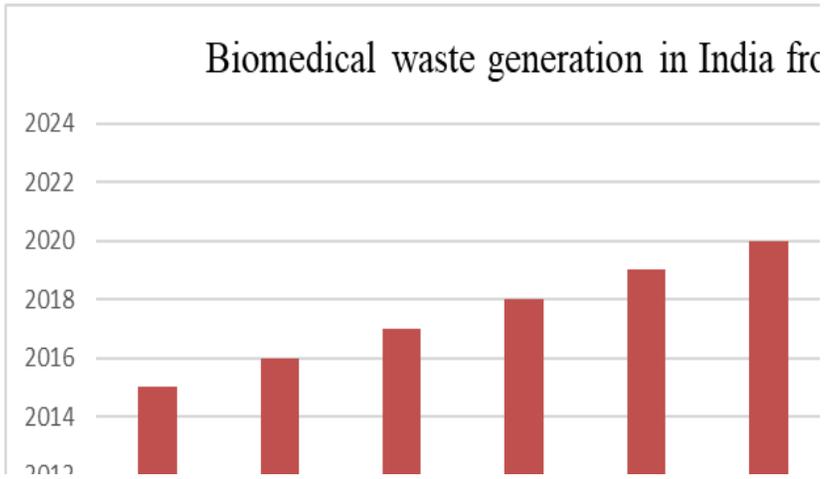
- Inefficient, linear “produce-consume-dispose” waste model in hospitals
- Poor segregation, open dumping, and toxic incineration practices.
- Lack of circular economy application and measurement in Hospital waste.



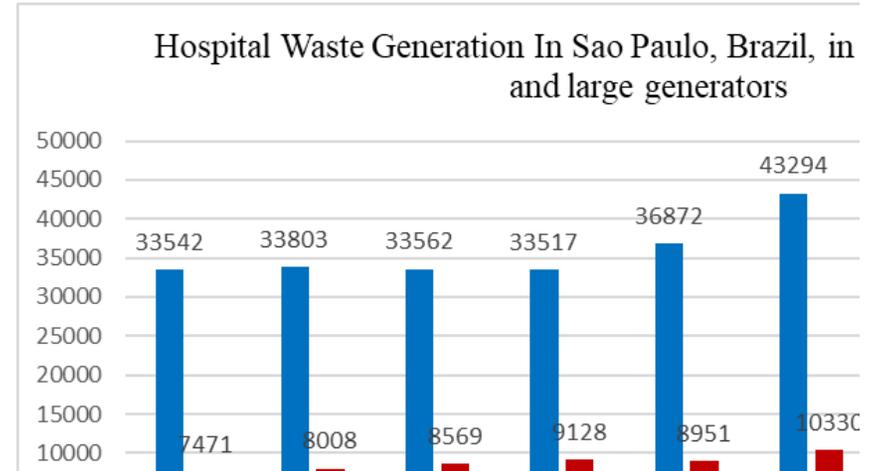


Categories of Bio-Medical Waste as per the Rule

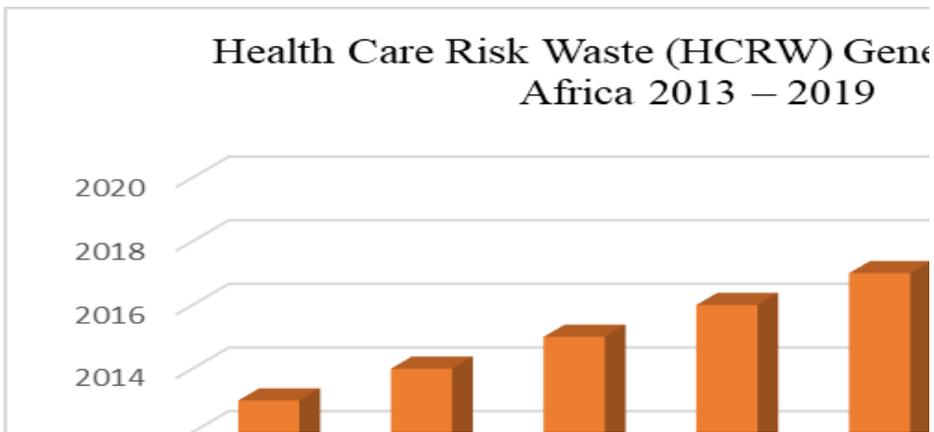
Option	Treatment & Disposal	Waste Category
Category 1	Incineration \$/deep* burial	Human Anatomical Waste (human tissues, organs, body parts)
Category 2	Incineration \$/deep*burial	Animal Waste, tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals / colleges, animal houses)
Category 3	Local autoclaving/ micro waving/ incineration \$	Microbiology & Biotechnology waste (laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents)
Category 4	Disinfections(chemical treatment @/autoclaving/micro waving and mutilation shredding #	Waste Sharps (needles, syringes, scalpels blades etc.)
Category 5	Incineration \$/ destruction and drugs disposal in secured landfills	Discarded Medicines and Cytotoxic drugs (waste comprising of out-dated, contaminated and discarded medicines)
Category 6	Incineration\$, autoclaving/micro waving	Solid Waste (Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, line beddings)
Category 7	Disinfections by chemical treatment @ autoclaving/micro waving& mutilation shredding #	Solid Waste (waste from disposable items other than the waste sharps such as tubing, catheters, intravenous sets etc.)
Category 8	Disinfections by chemical treatment @ and discharge into drain	Liquid Waste (waste from laboratory and washing, cleaning, house-keeping and disinfecting activities)
Category 9	Disposal in municipal landfill	Incineration Ash (ash from incineration of any bio-medical waste)
Category 10	Chemical treatment @ and discharge into drain for liquid and secured landfill for solids	Chemical Waste (chemicals used in production of biological, chemicals, used in disinfection, as insecticides, etc.)



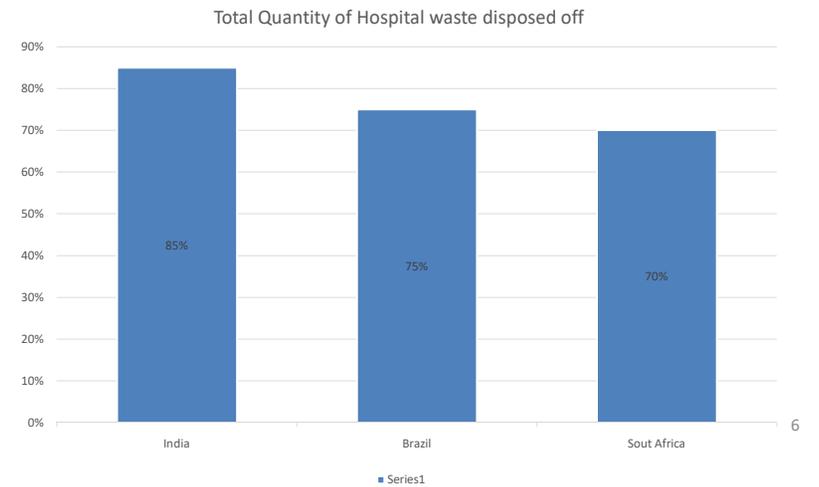
CPCB_Inventory of BMW Management 2015-2023



Source: SP Regula, Public Services Regulatory Agency of the Municipality of Sao Paulo, Brazil



Source: South African Waste Information Centre (2019)



India

Home | Sitemap | RTI



Central Pollution Control Board
Ministry of Environment, Forest and Climate Change
Government of India

NEW CPCB's

HOME	ABOUT CPCB	STANDARDS	CPCB'S ACTIVITIES	
Home	CPCB's Activities	Waste Management	Bio Medical Waste	Inventory of BMW Manag
Air Quality Management	+	Inventory of BMW Management		
Water Quality Management	+	▶ BMWM Status 2023		
Quality Assurance/Quality Control	+	▶ BMWM Status 2022		
Waste Management	+	▶ BMWM Status 2021		
Contaminated Sites	+	▶ BMWM Status 2020		
Industrial Pollution	+	▶ BMWM Status 2019		
Noise Pollution	+	▶ BMWM Status 2018		
		▶ BMWM Status 2017		
		▶ BMWM Status 2016		

prefeitura.sp.gov.br/web/spregula

- Service Framework
- Service Portal 156
- Consult Waste Collection
- About SP Regula
- Who's who
- Promoting Integrity
- Laws, Decrees and Resolutions
- General Personal Data Protection Law (LGPD)
- CEO's Agenda
- Management

Paullstar e tudo de bom.

Showing 1 - 1 of 1 results.

ATENÇÃO! < . . .

HOSPITAIS, CLÍNICAS, CASAS DE REPOUSO, IML

NOVAS REGRAS PARA COMUNICAÇÃO DE ÓBITO E ENTREGA DA GUIA DE CONTRATAÇÃO

Todos os estabelecimentos de saúde, públicos ou privados, devem seguir as novas regras para emitir Declaração de Óbito (PRO-AIIM).

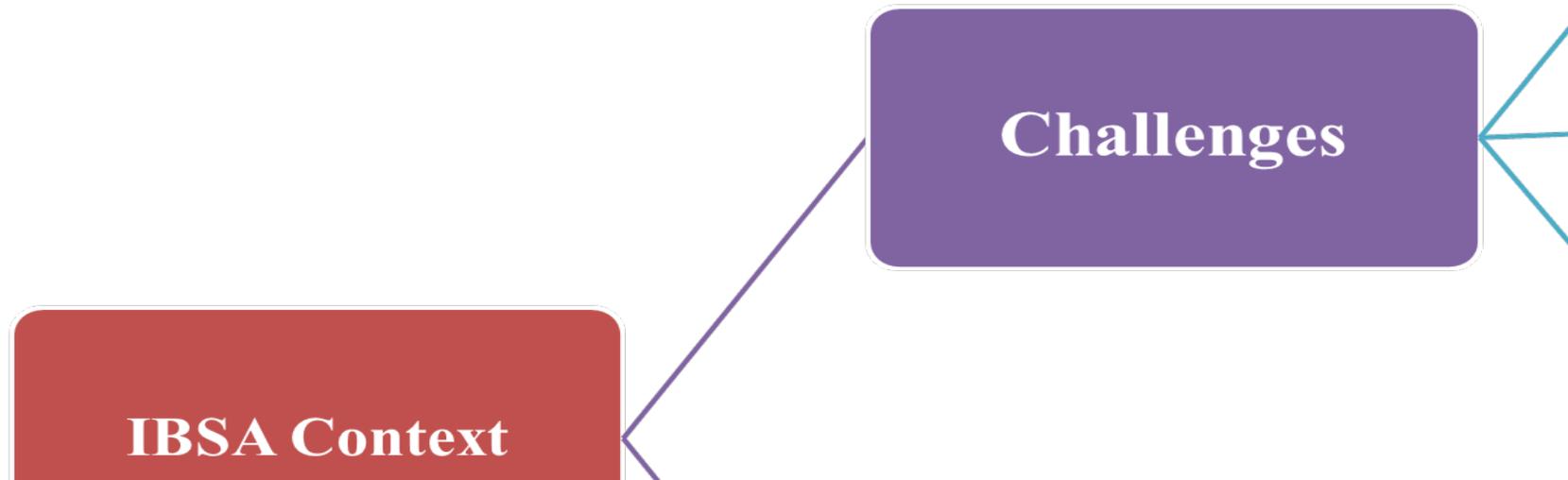
CLIQUE AQUI E SAIBA MAIS

NEWS

Literature Insights

- **Waste ≠ static: Value and waste co-exist (Wallstrom, 2016).**
- **Waste Management Theory (WMT): Closed-loop design and reuse.**
- **CE: Reduce, Reuse, Recycle + systemic transformation (Kirchherr et al., 2017).**
- **Gap: Few studies integrate CE with hospital waste analytics in low-resource settings (China and Europe).**

IBSA Context & Opportunities



ED

- Home
- Key Initiatives
- Life
- ...

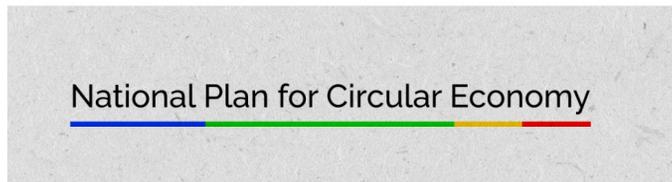
Home / Key Initiatives / LIFE



gov.br | Federal Government | Government Agencies | Access to information | Legislation | Acces

Ministry of Finance

Home > Access to Information Actions and Programs Novo Brasil - Ecological Transformation Plan Novo Brasil Programs National Plan for Circular Economy > > > >



- **SDG6 and SDG12----The three principles of SCP– improving quality of life without increasing environmental degradation; decoupling economic growth from environmental degradation; and applying life-cycle thinking– balance the developmental needs on the one hand, whilst charting out a trajectory for sustainable consumption and production patterns on the other. (Chaturvedi, 2023)**
- **SCP are particularly discussed within the framework of Circular Economy (CE), where the economy is reconstructed on the 3 R's–Reduce, Reuse and Recycle**
- **6Rs (reduce, reuse, recycle, reclaim, recover, restore) (Nikita and Kalbar 2023)**
- **The Ellen MacArthur Foundation (EMF) defines the circular economy as a system that is restorative and regenerative by design, aiming to eliminate waste and pollution, keep products and materials in use, and regenerate natural systems. (EMF, 2010, 2015)**

Research Questions

How IBSA countries through corporation can embed circular economy principles into its Hospital waste system in a manner that is economically viable, socially inclusive, and environmentally sustainable?

Objectives

The main objective of the study is to evaluate the extent and effectiveness of circular economy practices in hospital waste management across IBSA countries and assess the contribution of trilateral cooperation to policy development, technological advancement, and knowledge sharing.

Methodology Overview

1. Research Design

1. A comparative study of India, Brazil, and South Africa.
2. Uses both quantitative data (numbers, records) and qualitative insights (interviews, documents).

2. Data Collection

1. **Hospital-level data:** Waste generated, amount recycled, cost of disposal, compliance with biomedical waste rules.
2. **Government & institutional data:** National waste management policies, IBSA reports, official guidelines.
3. **Interviews & surveys:** Hospital managers, waste staff, policymakers, and recycling vendors.
4. **Case studies:** Selected hospitals in each country that practice circular economy models.

Method-1

Circularity Performance Index

Recycling Rate (Rr): $Rr = W_r/W_t$

Recycling Circularity (Rc)= $Rc = \Sigma(W_i \times CL_i) / \Sigma W_i$

Circularity Performance (Cp) = $Cp = Rr \times Rc$

Circularity Levels (CL)

Circularity class	Circularity level	Treatment code	Definition
C1	CL7	G01, R01	Unlimited recycling as raw material in original form
C2	CL6	R02	Multiple recycling as raw material in original form
C3		R02	Multiple recycling as raw materials in different forms (upcycling)
C4		R02	Multiple recycling as raw materials in different forms with a higher market value (upcycling)
C5	CL5	R03	Single recycling as additives of other products
C6	CL4	R04	Single recycling as an energy source with no potential to be reused and a negative market value
C7	CL3	R05, R06	Single recycling returned to the biosphere with no potential to be reused and a negative market value
C8	CL2	R07,	Direct return to the biosphere without treatment and a negative market value
C9	CL1	R08, R09, R10, R99	Single recycling as an energy source with no potential to be reused and a negative market value

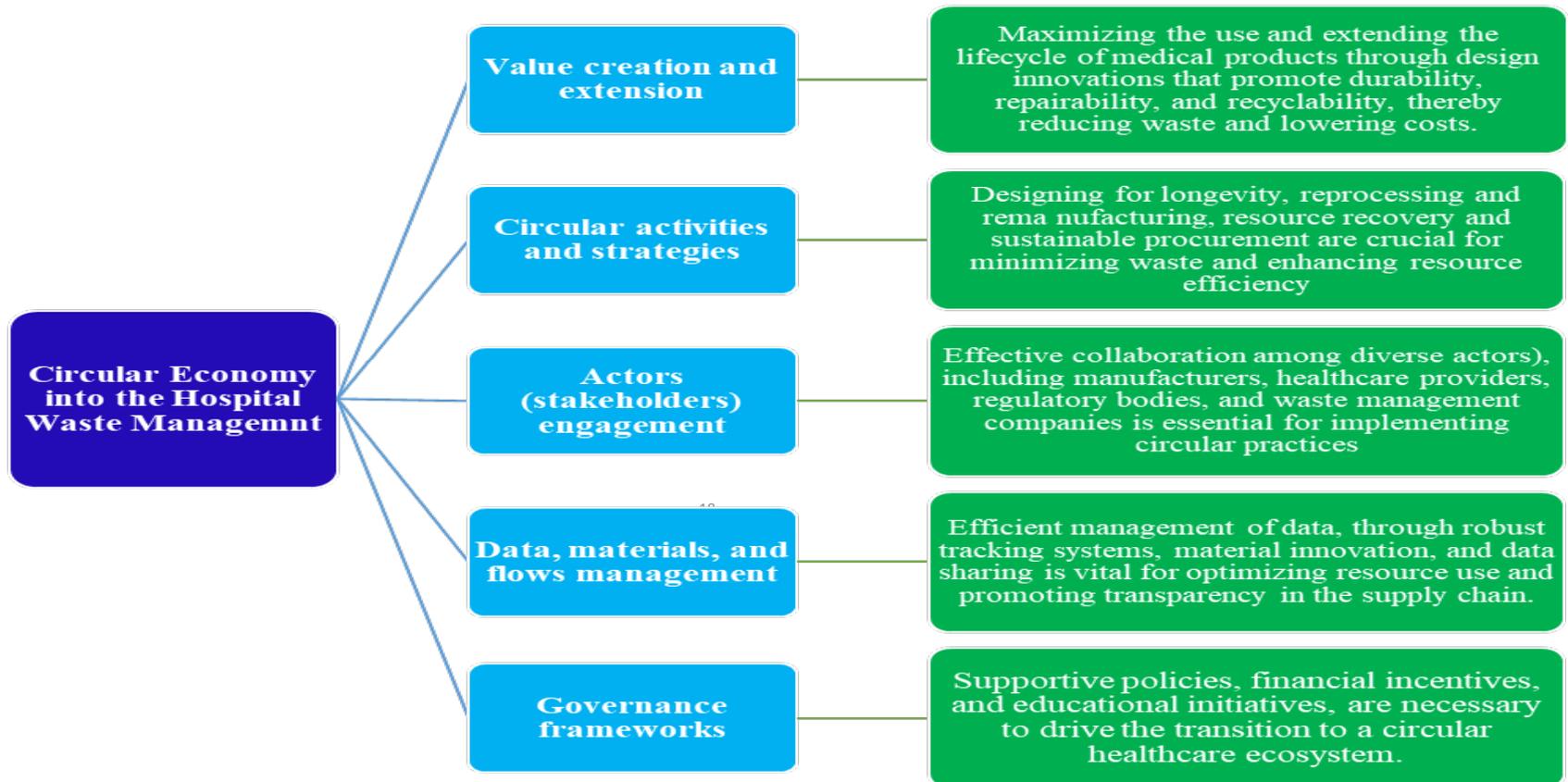
Circularity Based Responses

Indicators	India Quantity (Kg/Ltr/₹ or USD)	BrazilQuantity (Kg/Ltr/₹ or USD)
Total weight of hospital waste generated	3,200,000 kg/year	4,400,000 kg/year
Weight of recycled hospital waste	450,000 kg/year	600,000 kg/year
Type of Hospital waste recycled	Paper, Plastic, Glass, Metals, Carton, Can	Paper, Plastic, Glass, Metals
Quantity of material actually recycled and used (kg)	260,000 kg/year	450,000 kg/year
Total recyclable waste generated (kg)	350,000 kg/year	650,000 kg/year
Market prices of recycled and total recyclable waste	₹ 20 – 30 per kg	₹ 10 – 20 per kg
Annual operating cost for waste treatment	10,000,000	60,000,000
Annualised capital cost of treatment infrastructure	Private Agency	80,000,000
Income Generated	360000/year	NA

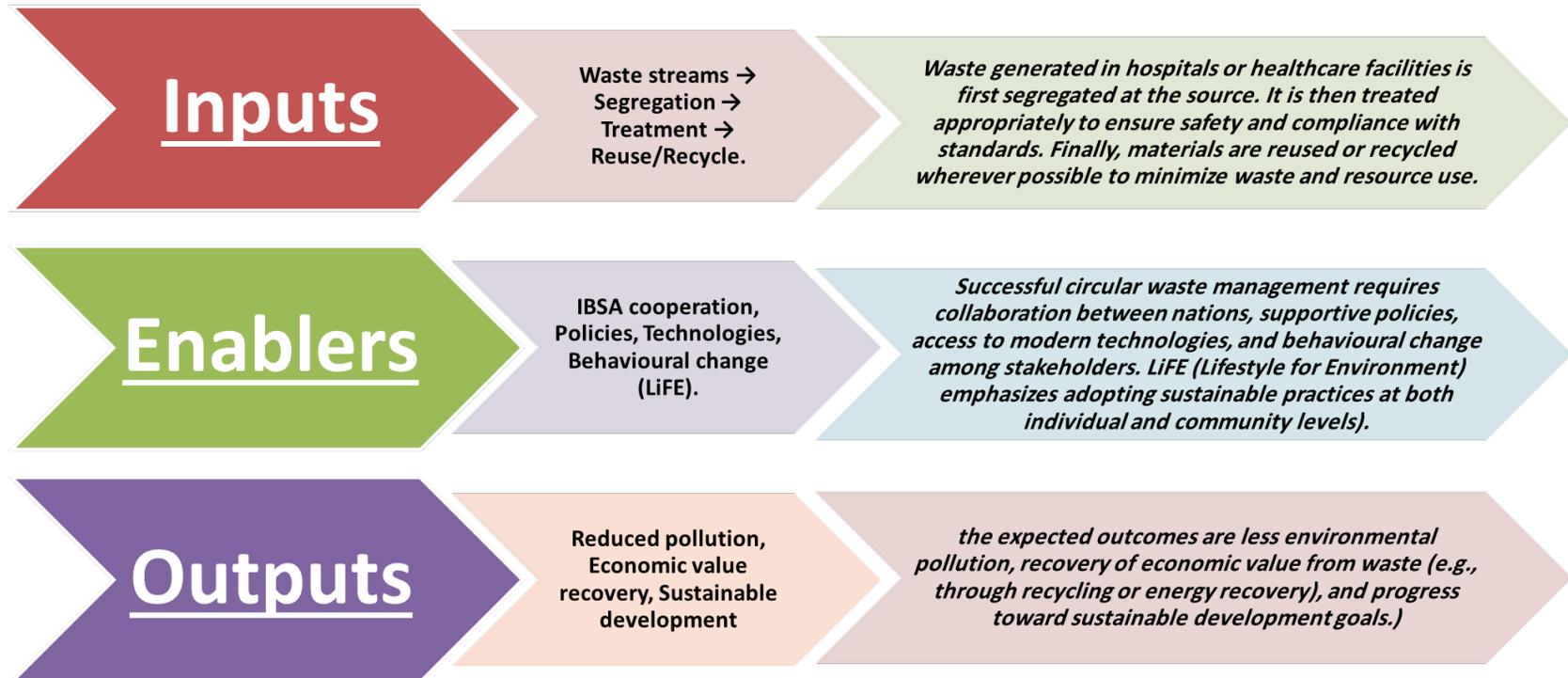
Circularity Performance (Cp)

Indicator	India	Brazil
Recycling Rate (Rr)	0.141 (14.1%)	0.136 (13.6%)
Recycling Circularity (Rc)	5.67	5.75
Circularity Performance (Cp)	0.80	0.78
Circularity Levels used	Paper (CL5), Plastic (CL4), Glass (CL7), Metals (CL7), Carton (CL4), Can (CL7)	Paper (CL5), Plastic (CL4), Glass (CL7), Metals (CL7)

Circularity in the area of Hospital waste management

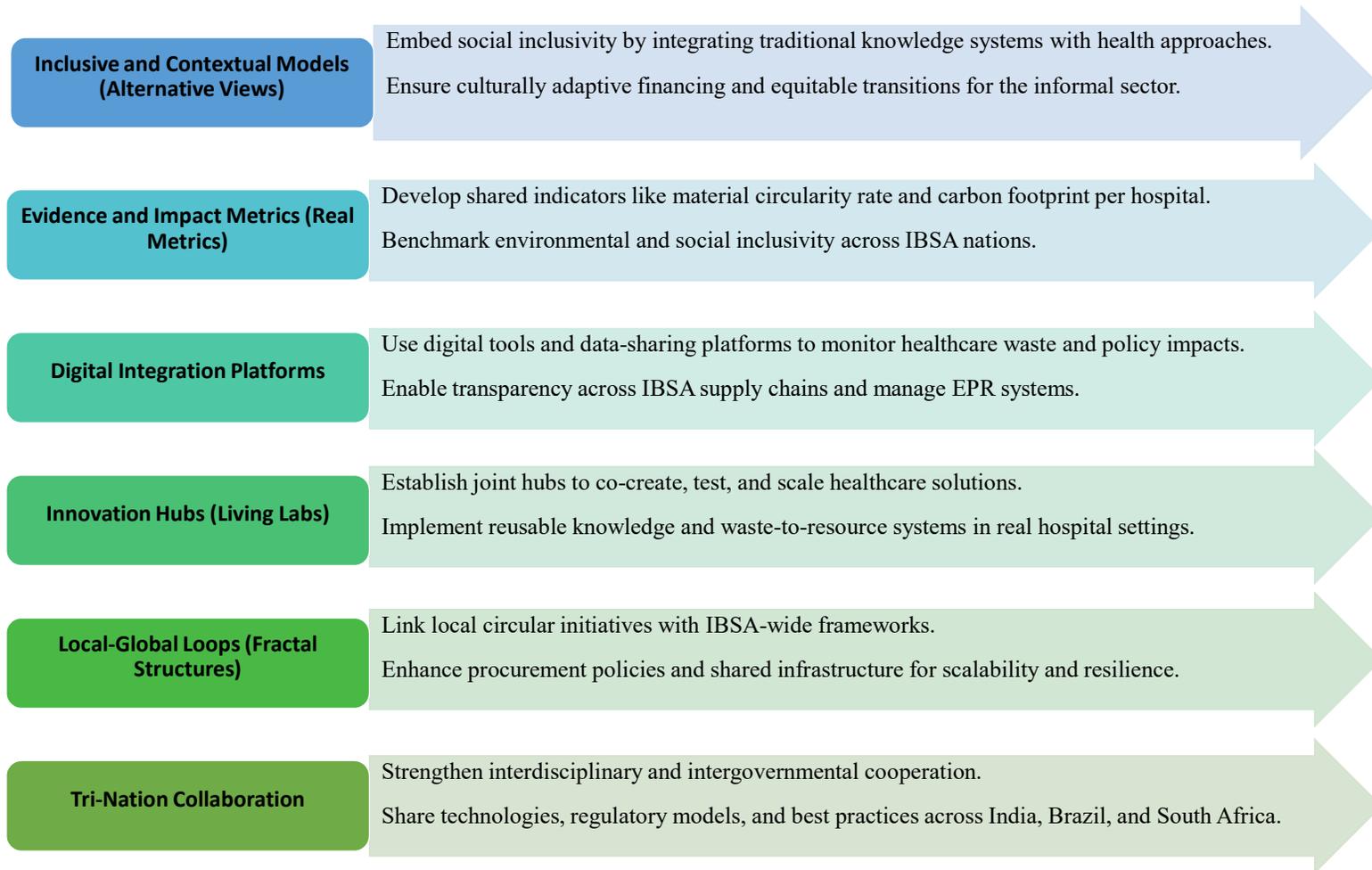


Conceptual Framework



Sabyasachi Saha, 2025

Policy Framework for implementing circular economy principles in the healthcare sector of IBSA Countries



Policy Recommendations

- Integrate CE metrics into hospital audits.
- Strengthen IBSA-level platforms for technology transfer.
- Involve informal sectors in formal CE pathways.
- Launch awareness campaigns (LiFE initiative).
- Harmonised CE Standards & Regulations
- Trilateral Innovation & Technology Hub
- Capacity Building & Workforce Development
- Digital Monitoring & Data Integration
- Joint Financing Mechanisms
- Community Engagement via LiFE model

13th IBSA Trilateral Ministerial Commission Meeting The Ministers' emphasis on stronger health systems, universal access to medical technologies, and the reduction of socially determined diseases directly aligns with circular economy principles in healthcare waste management.....

Conclusion

- **Transitioning to CE in hospital waste management is vital for SDGs.**
- **IBSA cooperation offers a unique South–South opportunity.**
- **Circular economy can turn waste into value, reduce hazards, and create economic opportunities.**

References (Selected)

- - Tandon et al., 2010; Remoundou et al., 2009.
- - Kirchherr et al., 2017, 2023.
- - Nath et al., 2025; Kayal et al., 2019.
- - WHO Reports (2007, 2022, 2024).
- - Savitha & Joseph, 2023.

Thank You