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From Seoul to Swachh Bharat: What India Can Learn from Korea's Cleanliness Economy

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April 2026 marks a defining inflection point in the India-Korea partnership as South Korean President Lee Jae-myung is visiting India.

Both nations are jointly committed to achieving USD 50 billion in bilateral trade by 2030. Discussions are expected to span semiconductors, green hydrogen, artificial intelligence, battery manufacturing, and defence. India's launch of the India Semiconductor Mission 2.0 in February 2026, focused on equipment, materials, and intellectual property, aligns precisely with Korea's deep expertise in chip design and manufacturing ecosystems.

Yet amid this impressive diplomatic choreography, an awkward question persists. India and Korea share not only ambitions in technology and trade but also a shared history of rapid urbanization and its environmental consequences (Table 1).

Table 1: India-South Korea Bilateral Economic Snapshot

Indicator	Status / Value
Bilateral Trade Value (2024)	USD ~22 Billion
South Korean FDI in India	USD 7.6 Billion (cumulative)
India-Korea Special Strategic Partnership	Established 2015
Green Hydrogen Collaboration	MoUs signed 2023-25
India Semiconductor Mission 2.0	Launched Feb 2026
Korean Firms in India	700+ companies operating

Sources: Ministry of Commerce & Industry, GoI; KOTRA India; Asian Community News.

South Korea is globally recognized for its "Volume-Based Waste Fee" (VBWF) system, transforming from a nation struggling with landfill capacity to a world leader in recycling and circular economy practices.

South Korea faces a unique set of geographic and demographic pressures: a) High Population Density: With over 50 million people packed into a relatively small land area, space for landfills is extremely limited; b) Rapid Urbanization: The "Miracle on the Han River" led to explosive

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industrial growth, resulting in a massive surge in waste that traditional disposal methods couldn't handle; and c) Resource Scarcity: Lacking significant natural resources, the country pivoted toward "urban mining"—recovering materials from waste to fuel its manufacturing sector.

South Korea's rapid industrialisation and urbanisation in the 1960s–1990s created severe problems of waste accumulation, polluted rivers, overflowing landfills, industrial discharge and poor urban sanitation given high density of 537 persons/Km^2. The household waste increased from 1200 tonnes/day to 84000 tonnes/day between 1970 and 1990. By the early 1990s, many landfill sites around Seoul were reaching capacity, while rising consumption and dense urban living were increasing pressure on waste systems and public health.

In response, South Korea adopted aggressive waste management policies, including the Volume-Based Waste Fee system in 1995, stronger recycling laws, industrial waste tracking and food waste bans. The objective was not only to improve cleanliness, but also to reduce pollution, protect public health and improve urban liveability.

This paper, focused on waste management is organized in 5 sections. In the next section, focus in on the practices in Korea. In Section 3, the concept and development of Swachh Bharat is discussed. The comparison between South Korea and India is presented in Section 4. Finally, conclusion follow in Section 5.

2. Korean Cleanliness Miracle: Polluted Rivers to Global Benchmarks

It is easy to forget that South Korea was not always the model of urban cleanliness it is today. In the 1950s and through rapid industrialization drives of the 1960s, Korean cities bore the hallmarks of developing-world pollution. The river, Han, which now anchors the aesthetic and recreational identity of Seoul, was at the time little more than an open drain carrying industrial effluent and untreated sewage.

The transformation that followed was deliberate, sustained, and deeply integrated into Korea's broader economic development strategy. As early as the 1960s, the Korean government decided: water, sanitation, and hygiene would not be managed as peripheral welfare concerns but as central pillars of economic planning, linked explicitly to housing development, public health, industrial transformation, and human capital formation. A 20-year National Water Resource Plan was launched in 1965, revised periodically, and supported by continuous legal upgrades alongside dedicated public financing.

Close Relationship Between Waste Management, Tourism and Economic Growth

South Korea recognised that cleanliness and waste management are closely linked to tourism, investment, public health and economic growth. Cleaner cities attract more tourists, support hospitality and retail businesses, reduce health costs and improve the quality of life for residents.

Clean urban areas such as Seoul, Busan and Jeju Island benefit from strong public sanitation, clean streets, well-maintained public toilets and efficient waste collection. This improves the country's image and supports tourism revenues. Cleanliness also reduces disease, improves worker productivity and increases the attractiveness of cities for investment.

Strategy of Waste Management in Korea Including Incentives

South Korea's waste management strategy combines regulation, pricing, technology and public participation. South Korea's strategy evolved from open dumping (1960s–70s) to a comprehensive circular economy model: Waste Control Act (1986), Volume-Based Waste Fee (VBWF) system (1995), Extended Producer Responsibility (EPR, 2003), Framework Act on Resource Circulation (2018), and the 2025 Circular Economy Act.

The "4Rs" strategy prioritizes reduction, reuse, recycling, and resource recovery, backed by Volume-Based Waste Fee (VBWF) systems using paid bags since 1995. The most important feature is the Volume-Based Waste Fee system, under which households buy official garbage bags for general waste. The more waste a household generates, the more it pays-pay-as-you-throw model. Recyclables are collected separately at lower or no cost. This creates a direct financial incentive to reduce waste and recycle more.

Other important incentives include lower disposal costs for segregated recyclable waste; free or subsidised recycling collection; penalties for littering and illegal dumping; community awards for cleaner neighbourhoods; public ranking of municipalities on cleanliness; and incentives for businesses that reduce packaging and recycle more.

The Korean system is based on the principle that polluters should pay and that waste should be treated as a resource.

Industrial Waste Management

Industrial waste constitutes nearly 87.5 percent of total waste. It is strictly tracked via the Allbaro digital system (introduced 2003, web/mobile/RFID-based), which monitors the entire chain from generation to transport and final treatment to prevent illegal dumping. Large dischargers must submit annual waste reduction plans; high performers receive incentives like

inspection exemptions, awards, and financial support for eco-friendly upgrades. EPR applies to packaging, electronics, and more. Treatment prioritizes recycling, followed by incineration and safe landfilling for hazardous waste. On-site treatment options minimize transport risks.

South Korea also applies strict penalties for improper disposal of industrial waste and requires treatment before discharge into rivers or public land. Industrial waste is increasingly recycled and reused where possible.

Food Waste Management

South Korea is one of the global leaders in food waste management. In 1995, only around 2 percent of food waste was recycled. Today, over 95 percent is recycled into compost, animal feed and biogas.

The government banned the disposal of food waste in landfills in 2005. Food waste is collected separately and in many apartment complexes residents use RFID-enabled bins, where waste is weighed and households are charged according to quantity. Restaurants encourage portion control.

This has reduced food waste generation and encouraged better household behaviour. The system is also financially sustainable because user fees cover a significant part of the cost of food waste collection and recycling.

General Waste Management

South Korea requires households to segregate waste into categories such as food waste, plastics, paper, glass, metal and residual waste. Apartment complexes and neighbourhoods have dedicated recycling stations where citizens separate waste carefully.

The country's waste fee system encourages recycling because households pay only for general waste disposal, while recyclable waste is cheaper or free to dispose of. This has helped South Korea maintain one of the highest recycling rates among OECD countries.

General waste that cannot be recycled or composted is sent to high-efficiency incineration plants. These plants are often located underground or integrated into community centers, using the heat generated from burning trash to provide hot water and heating to surrounding neighbourhoods.

Local governments handle collection (99.9 percent household coverage). Smart technologies and public awareness ensure high compliance and efficiency.

Sanitation

Sanitation is fully integrated with waste and environmental policies. The 1961 Filth Cleaning Act initiated street cleaning and collection; modern systems feature advanced sewage treatment, water quality restoration (e.g., reduced river pollution), and hygienic waste facilities. High public hygiene standards, modern infrastructure (often underground to minimize visual/odour impact), and community involvement maintain exceptional cleanliness, supporting public health and urban liveability.

Sanitation in South Korea is supported by clean public toilets, regular maintenance, adequate water supply and strong local government accountability. Public toilets in markets, stations, parks and commercial centres are well maintained and frequently cleaned.

Korea also places strong emphasis on school hygiene, public awareness and citizen responsibility. Cleanliness is treated as a public norm, and littering is socially discouraged as well as penalised.

This contributes not only to hygiene and health, but also to women's safety, tourism and civic pride.

Urban Waste Management

Urban waste management in South Korea is highly organised. Cities such as high-density Seoul, use designated waste bags, underground waste collection systems, smart bins and GPS-monitored waste vehicles.

Municipal governments are responsible for collection, recycling and public awareness. Many apartment complexes have separate areas for food waste, paper, glass and plastics. Urban waste is collected regularly, and penalties for illegal dumping are strictly enforced.

Technology is increasingly being used to monitor waste collection and improve efficiency.

Rural Waste Management

Rural South Korea also maintains strong waste management standards. Villages have designated waste collection points, separate bins for recyclables and regular waste collection services.

The government provides collection points for pesticide containers and plastic mulching films. Community-based collection programs offer "trash-for-cash" incentives to keep rural landscapes clean and prevent the burning of agricultural plastics, which causes air pollution.

South Korea's food waste recycling rate rose from just 2 per cent in 1995 to 95 per cent today. Seoul installed 6,000 RFID-equipped smart bins that charge residents by weight of food waste deposited, reducing Seoul's food waste by 47,000 tonnes in six years and saving the city USD 8.4 million in collection charges. From 1998 to 2008, over USD 800 million in private sector investment financed 100 wastewater treatment plants across the country (Table 2).

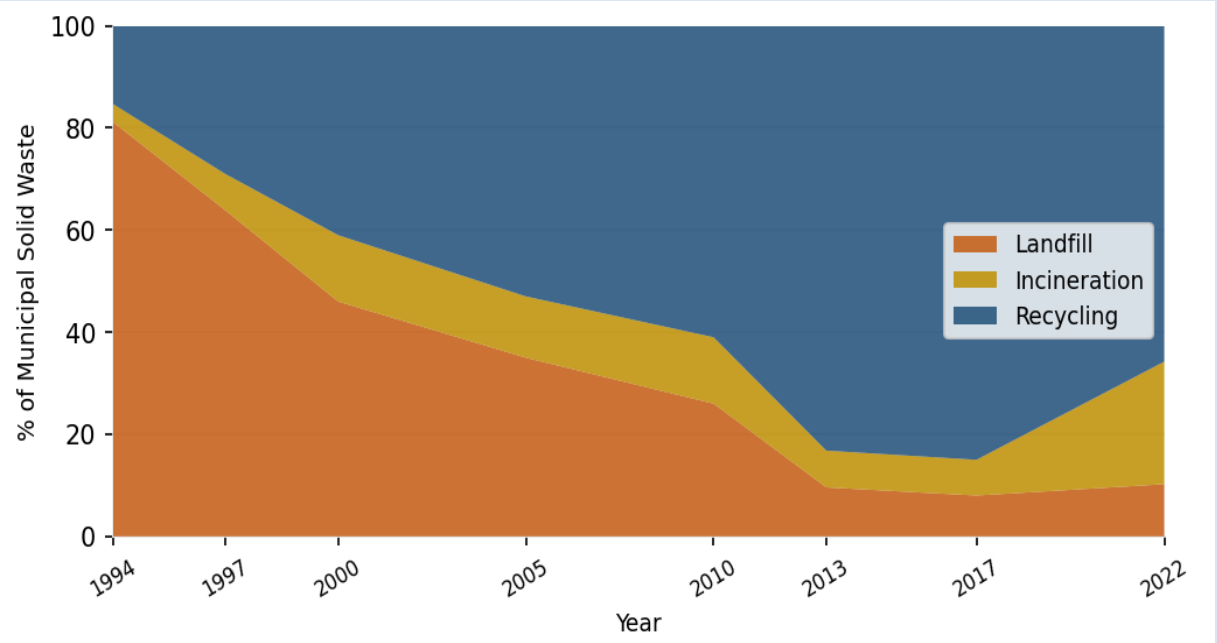
Table 2: South Korea's Waste and Cleanliness Economy - Key Milestones

Metric	Value / Achievement
Food Waste Recycling Rate (2022)	95-98%
Overall Domestic Recycling Rate (2022)	65.77%
Landfill Usage (1994 vs 2022)	81.2% reduced to 10.23%
Waste Mgmt Market Value (2023)	USD 25.56 Billion
Waste Mgmt Market Projected (2030)	USD 42.25 Billion (CAGR 6.4%)
Seoul Smart Bins Installed	6,000 RFID-equipped bins
Food Waste Reduction (Seoul, 6 yrs)	47,000 tonnes
City Savings from Smart Bins	USD 8.4 million
Private Investment in Wastewater (1998-2008)	USD 800+ million
Korea OECD Recycling Rank (2013)	2nd highest (59% rate)

CAGR = Compound Annual Growth Rate.
Sources: WEF; Statista 2024; Ministry of Environment, Korea; Springer 2025; NextMSC Research 2025; World Bank WASH Blog; OECD.

Korea’s success is not merely infrastructural but behavioural. The pay-as-you-throw system converts cleanliness into an economic decision for households, aligning individual incentives with public outcomes. India’s model, in contrast, relies heavily on moral persuasion rather than economic signalling. The dramatic shift in Korea's waste management approach over three decades is captured in Figure 1, which shows landfill usage declining from over 80 per cent to under 11 per cent as recycling rose to dominate.

Figure 1: South Korea Waste Management Evolution - Landfill to Recycling (%) 1994-2022



Source: Ministry of Environment, South Korea; Springer Journal of Material Cycles and Waste Management, 2025

3. Swachh Bharat: Ambition, Achievement, and the Gap

On October 2, 2014, India launched the Swachh Bharat Mission from Rajghat. The mission was the largest sanitation programme in modern history by scale and scope, targeting open defecation elimination across 600,000 villages and thousands of urban centres, construction of over 100 million household toilets, and a fundamental shift in civic behaviour across 1.4 billion people.

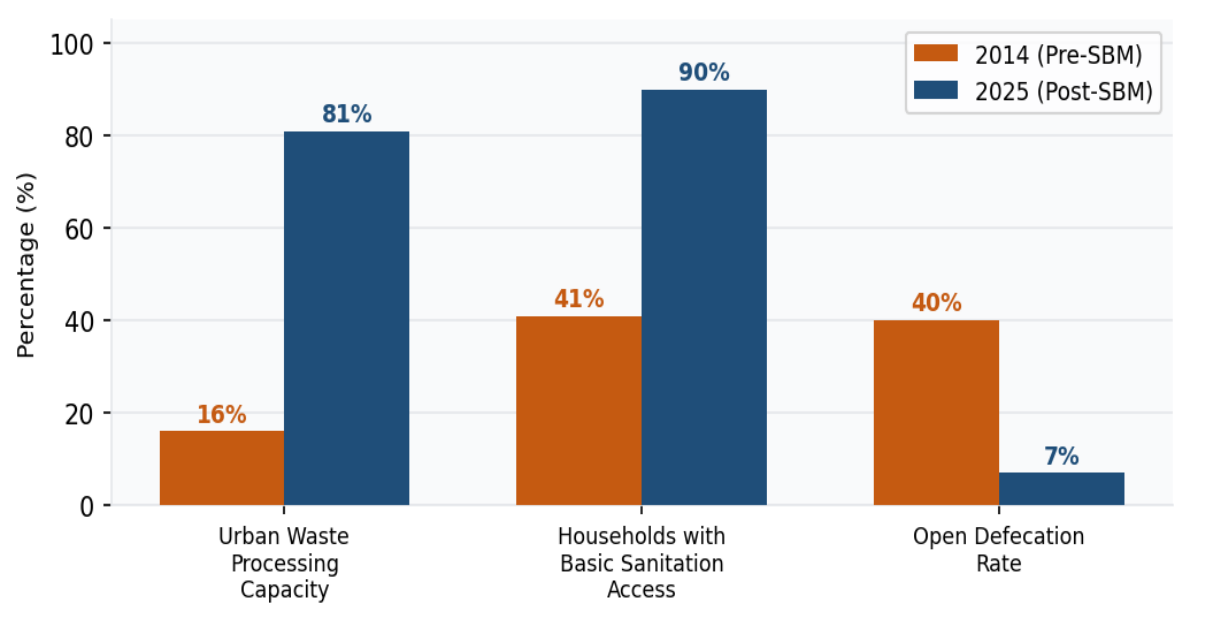
By several measures, the results are real and meaningful. India's household sanitation coverage increased from 41 per cent in 2013 to 90 per cent in 2019 according to national survey data. The WHO and UNICEF Joint Monitoring Programme reported that India's national open defecation rate declined to 7 per cent in 2024, with urban open defecation eliminated entirely. Urban waste processing capacity has grown from 16 per cent in 2014 to 81 per cent in 2025.

A UNICEF-supported study found that the programme prevented an estimated 300,000 deaths and averted 14 million disability-adjusted life years between 2014 and 2019 (Table 3). Households in open-defecation-free areas saw annual benefits of approximately INR 50,000 in the form of medical costs avoided and time saved. With benefits of toilet-building exceeding costs by 7 times, the initiative has delivered overwhelmingly positive outcomes even for the poorest Indian households. Yet these figures, remarkable as they are, also reveal the scale of

what remains unaddressed. Poor sanitation and hygiene remain among the leading drivers of premature mortality in India. Diarrhoeal disease alone, 58 per cent of which is attributable to the faecal-oral pathway linked to inadequate sanitation, accounts for USD 18 billion in health-related economic losses annually. Children under five bear a disproportionate burden — more than three-quarters of premature mortality-related economic losses from poor sanitation are attributable to deaths and disease in this age group. Every child lost to a preventable waterborne disease represents a permanent withdrawal from India's future human capital stock.

And yet the gap between aspiration and reality remains uncomfortable. Poor sanitation continues to impose an invisible economic tax on the nation. India's rivers remain among the most polluted in the world. Public spaces under flyovers, road dividers, and urban peripheries continue to serve as informal dumping grounds. Rapid urbanization is generating waste volumes that outpace collection and processing capacity in smaller cities. Figure 2 illustrates the scale of progress under the Swachh Bharat Mission across three key metrics between 2014 and 2025.

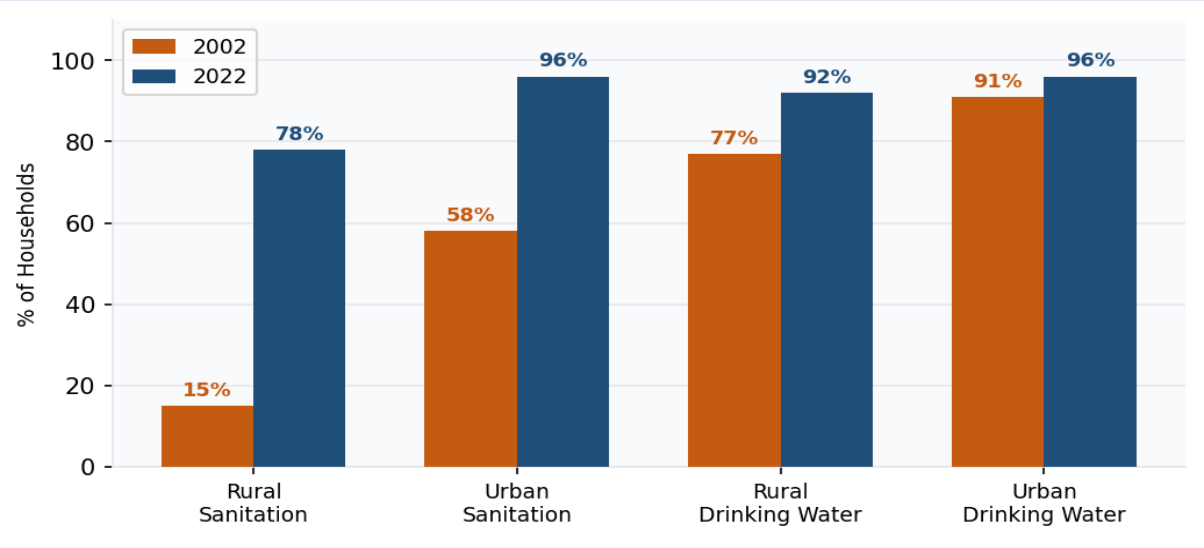
Figure 2: India Swachh Bharat Mission - Key Outcomes Comparison (2014 vs 2025)



Source: IBEF; Ministry of Housing and Urban Affairs, GoI; WHO-UNICEF JMP 2025

The improvement in household access to basic water and sanitation between 2002 and 2022 is shown in Figure 3, with rural sanitation recording the sharpest gain of 63 percentage points.

Figure 3: India WASH Coverage - Households with Basic Access (2002 vs 2022, *in percentage)*



Source: WHO/UNICEF Joint Monitoring Programme (JMP), 2025

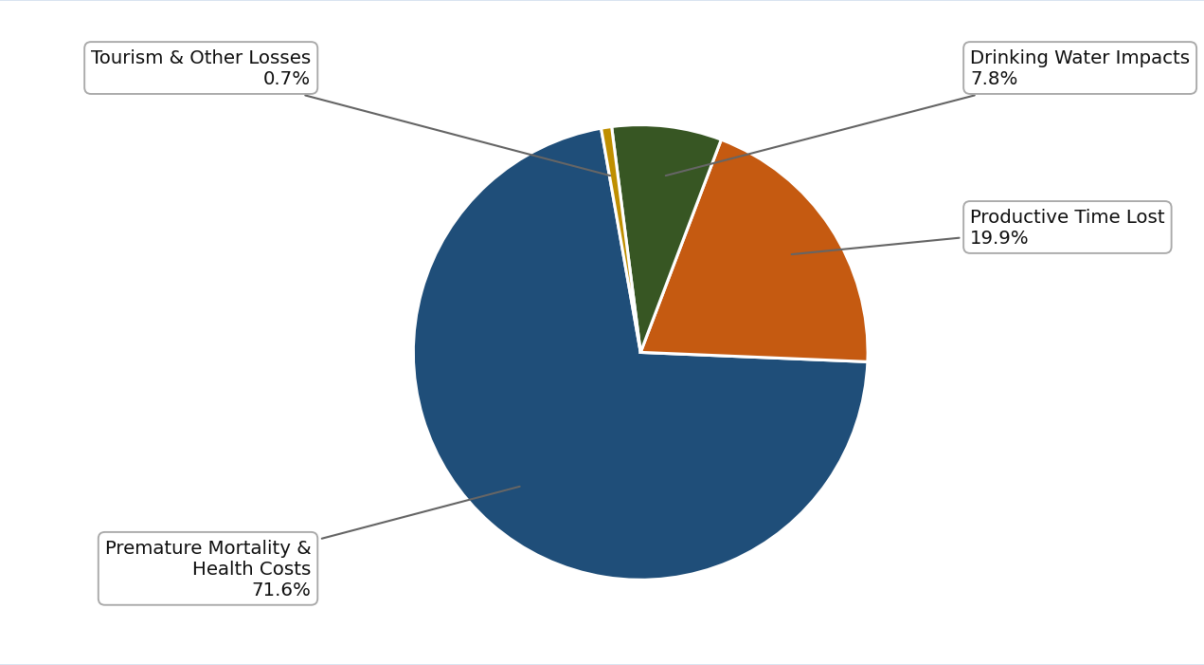
Table 3: Swachh Bharat Mission (SBM) - Economic Costs and Benefits

Economic Metric	Estimate
Annual cost of poor sanitation (GDP, 2006 baseline)	USD 53.8 Bn (6.4% of GDP)
Annual cost of poor sanitation (updated UNICEF estimate)	7.9% of GDP
GDP loss from poor sanitation (2015 estimate)	USD 106.7 Bn (5.2% of GDP)
Potential GDP savings if SBM goals fully achieved	INR 8.1 trillion (USD 126 Bn)
Annual benefit per household (ODF areas)	INR 50,000 (USD 780)
Financial return on toilet investment (average household)	1.7x over 10 years
Financial return (poorest 20% households)	2.4x over 10 years
Deaths prevented by SBM (2014-2019)	~300,000
DALYs averted by SBM (2014-2019)	14 million
SBM infant mortality impact	5.3 fewer IMR deaths / 1,000 live births
GoI Budget Allocation for SBM (2025)	INR 12,192 crore (USD 1.37 Bn)

INR = Indian Rupee. DALY = Disability-Adjusted Life Year.
Sources: World Bank / WSP 2010; UNICEF 2017-18 and Cost-Benefit Study; LIXIL / Oxford Economics 2016; Wilson Center / UNICEF 2024; WHO 2024; Nature Scientific Reports 2024; Union Budget 2025 / IBEF.

Figure 4 disaggregates India's annual sanitation economic loss of USD 53.8 billion, revealing that premature mortality and health costs alone account for over 71 per cent of the total damage.

Figure 4: ***Breakdown of India's Annual Sanitation Economic Loss - USD 53.8 Billion (6.4% of GDP)***



Source: World Bank / Water and Sanitation Program (WSP), 2010

4. A Comparison between India and South Korea

Korea's trajectory from a hygiene-deficit developing country in the 1950s to a global health benchmark today is inseparable from its economic growth story. By eliminating waterborne disease as a significant economic burden, Korea freed up household income, improved school attendance and cognitive development, extended productive working years, and reduced state healthcare expenditure. These are compounding economic dividends that accumulate across decades.

Circular Economy and Green Jobs

Korea's waste management system has become an economic engine in its own right. Its food waste recycling infrastructure, smart bin technology, urban composting, and wastewater treatment industry together constitute a market valued at USD 25.56 billion in 2023, projected to grow to USD 42.25 billion by 2030 at a compound annual growth rate of 6.4 per cent (Table 4). The government's target of achieving a 70 per cent recycling rate is projected to create over 5,000 new jobs in the recycling sector alone, alongside 1,200 GWh of annual energy generation from waste-to-energy projects. India's Swachh Bharat Mission Phase 2 has begun moving in this direction but these remain individual examples rather than systemic features.

Real Estate and Urban Competitiveness

Clean cities command premium real estate valuations. India's own Swachh Survekshan has revealed that cities with consistently high cleanliness rankings attract more business registrations, higher commercial rents, and greater investor confidence. The South Korean experience of using riverfront rehabilitation to catalyse urban economic renewal offers a directly replicable model for Indian cities with comparable waterways.

Table 4: Circular Economy Potential - India and South Korea

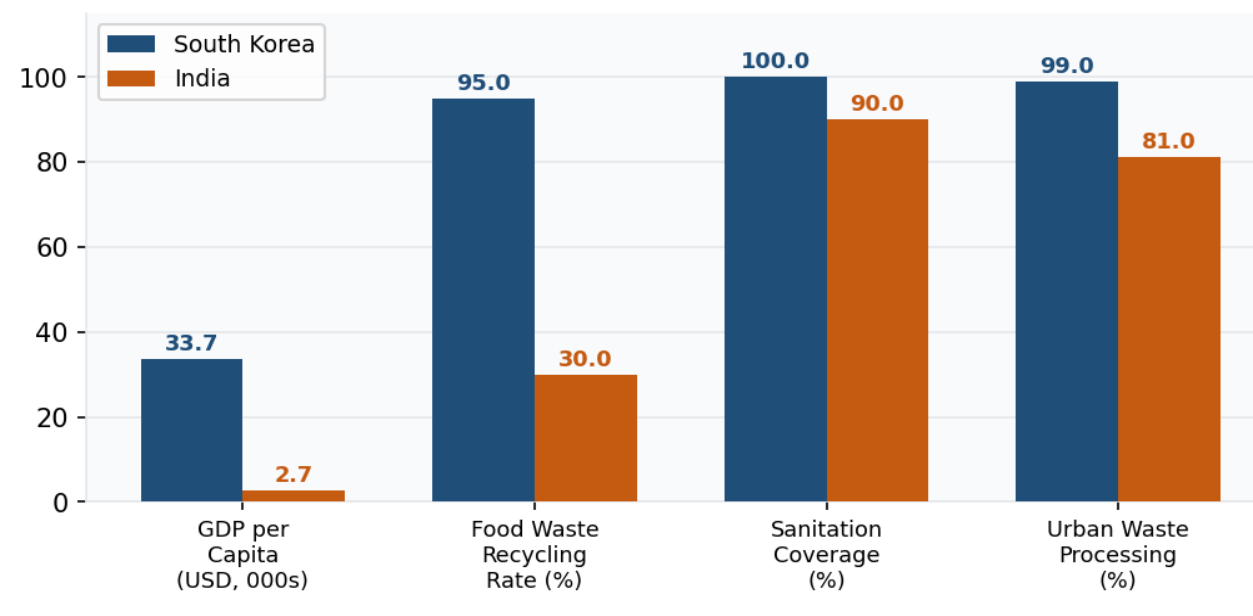
Indicator	South Korea	India (Current)	India (Potential)
Waste Recycling Rate	65.77%	~30-35%	70%+ (SBM Phase 2 target)
Food Waste Recycling Rate	95-98%	<5%	Significant uplift possible
Waste Management Market Size	USD 25.56 Bn (2023)	USD ~5 Bn	USD 20+ Bn by 2035
Urban Waste Processing	~99%	81% (2025)	100% (SBM target)
Smart Bin Technology	6,000 RFID bins (Seoul)	Emerging (few cities)	Large deployment scope
Private Sector in Waste Management	58% of treatment plants (2012)	Growing PPP model	Major opportunity
Green Jobs from Waste Sector	5,000+ projected (to 2030)	Nascent	Hundreds of thousands

Sources: NextMSC Research 2025; Ken Research 2025; IBEF; WEF; Ministry of Environment Korea; GoI SBM data.

The Comparative Cleanliness Economy Scorecard

Figure 5 places the two nations side by side across key cleanliness economy indicators, illustrating both the scale of Korea's achievement and the magnitude of India's opportunity. Table 5 provides a comprehensive scorecard of the cleanliness economy gap between the two nations.

Figure 5: Cleanliness Economy Indicators (2024)



Source: World Bank 2024; WEF; IBEF; KOSIS; WHO-UNICEF JMP 2025

Table 5: India vs South Korea: Cleanliness Economy Comprehensive Scorecard

Dimension	South Korea	India
GDP per Capita (USD, 2024)	~USD 33,700	~USD 2,700
Sanitation Coverage	~100%	90% (basic)
Open Defecation Rate (2024)	Eliminated	7% (rural ~11%)
Annual Sanitation GDP Loss	Negligible	5.2-7.9% of GDP
Water/Sanitation Policy Integration	Integrated since 1960s	Still sector-fragmented
Sanitation in School Curriculum	Embedded since 1970s	Improving (SBM schools)

Note: Some figures are estimated/approximated for comparability.
Sources: World Bank; OECD; IBEF; Ministry of Tourism India; KTOS; WEF; UNICEF.

The contrast is stark: Korea has monetised cleanliness as an economic sector whereas India continues to bear it as a systemic cost.

What Genuine Adoption of the Korean Model Would Look Like for India

The structural differences between India and Korea are real and should not be minimised. India's population is 27 times larger, its federal governance structure is vastly more complex, its rural-urban divide is more pronounced, and the cultural and behavioural diversity across states poses implementation challenges that Korea's relatively homogeneous society did not face. The suggestion that India can simply import the Korean model wholesale would not be the correct strategy. The focus should be that India can adopt the Korean philosophy: treating cleanliness infrastructure as a growth investment rather than a welfare expense, integrating

sanitation planning into economic development strategy rather than managing it as a separate social sector, building enforcement mechanisms with genuine financial consequences rather than relying exclusively on behavioural appeals, investing in private sector participation in waste processing and water infrastructure, and embedding cleanliness values into school curricula and early civic education.

President Lee's visit to India in April 2026 is an opportunity to place this dimension of the partnership explicitly on the agenda (Table 6). Trade in semiconductors and green hydrogen will dominate the headlines. But a bilateral working group on sustainable urban management, waste technology transfer, and cleanliness infrastructure could yield dividends whose economic scale rivals those of any technology partnership. Korean companies have world-leading expertise in smart waste management systems, water treatment technology, and urban environmental infrastructure. India has the scale, the demand, and the policy framework in Swachh Bharat Mission and Smart Cities Mission to deploy this expertise at transformative volume.

Table 6: Proposed India-Korea Cleanliness Economy Bilateral Agenda

Area	Korean Strength to Leverage	Indian Opportunity	Instrument
Smart Waste Infrastructure	RFID bins, pay-as-you-throw systems	4,000+ cities, Smart Cities Mission	Technology Transfer / JV
Wastewater Treatment	Private-sector led treatment plants	45 Bn litres/day untreated (2020)	PPP Framework / FDI
Food Waste Recycling	RFID-to-fertiliser ecosystem	Near-zero current recycling rate	Policy Replication
Water Resource Planning	20-year integrated planning model	Jal Jeevan Mission convergence	Advisory / Capacity Building
Cleanliness in Schools	Embedded in civic curriculum	SBM school programme scaling	MoU: Education Ministries
Green Hydrogen	R&D and manufacturing capability	India H2 Mission (2030 target)	Joint R&D Agreement
Waste-to-Energy	WtE projected 1,200 GWh/yr (2030)	Landfill remediation need (SBM)	Investment & Tech Transfer
Urban River Rehabilitation	Cheonggyecheon Stream model	Yamuna, Ganga, Sabarmati	City-to-City Partnership

Author's framework based on SBM Phase 2 priorities, Smart Cities Mission, and Korea-India Special Strategic Partnership agenda.

5. Conclusion: Beyond the Broom – Waste management to Economic growth

India can draw several actionable insights from the Korean model: Transitioning from a flat sanitation tax to a "Pay-as-you-throw" system could incentivize waste reduction in Indian urban centers; Korea proves that segregation is the only way to make recycling economically viable. India's informal waste-picking sector could be formalized and integrated into a tech-driven sorting system; Using RFID and mobile apps to track waste collection and provide transparency can reduce illegal dumping and improve municipal efficiency; and Given the high organic content in Indian waste, localized biogas plants (modelled after Korea's food recycling) could provide clean energy for cooking or electricity.

South Korea's success did not come from one programme alone. It came from decades of policy continuity, local government accountability, strict enforcement, financial incentives and strong public participation. India's Swachh Bharat Mission can build on these lessons to move from basic cleanliness to a broader circular economy and sustainable waste management system.

The economic arithmetic is unambiguous. Poor sanitation costs India between 5.2 and 7.9 percent of GDP annually, a number in the range of USD 100 to 150 billion in absolute terms at current income levels. Korea's waste management industry alone is worth USD 25.56 billion, growing toward USD 42 billion by 2030. India's potential in this space is an order of magnitude larger. Every rupee invested in sanitation returns 1.7 times in direct household savings and 2.4 times for the poorest. The case for a Korea-India cleanliness economy partnership is not merely environmental. It is among the most compelling economic partnerships available to both nations.

Cleanliness is not a matter of aesthetics. It is a matter of economic discipline. And in that discipline lies perhaps the most underutilised growth opportunity in India's development story. A nation that loses billions annually to the economics of dirt, and trillions to disease, cannot afford to treat cleanliness as a second-order concern.