



Chhattisgarh Environment  
Conservation Board



# Industrial Waste Management and Monitoring System

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A Case Study on the  
Transformation of Industrial  
Waste Oversight through Digital  
Monitoring

CSM Technologies

Chhattisgarh Environment  
Conservation Board (CECB)

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**Industrial Waste Management and Monitoring Systems are transforming traditional practices-enabling real-time insights, automation, and smarter compliance. It's not just about managing waste anymore; it's about driving sustainable innovation.**



# Introduction

India generates an estimated 7–8 million tons of hazardous industrial waste each year, with only 25–30% receiving proper treatment due to infrastructural and management challenges (CPCB, NPC). Additionally, around 60–65% of industrial waste is non-hazardous but still demands organized handling to prevent environmental degradation (CII).

These figures underscore an urgent need for robust systems that not only manage industrial waste efficiently but also ensure strict compliance with environmental regulations. Addressing this critical gap, the Chhattisgarh Environment Conservation Board (CECB) launched the **Industrial Waste Management and Monitoring System (IWMMS)**—a comprehensive digital solution designed to streamline the entire lifecycle of industrial waste, from NOC issuance to real-time disposal tracking and compliance reporting.



# Gaps in Industrial Waste Management Without Digital Platforms



## Data Collection and Verification Gaps

Instance: In Gujarat, a 2022 CAG audit revealed discrepancies of 25-30% between reported and actual hazardous waste generation in industrial clusters like Vapi and Ankleshwar due to manual record-keeping issues.



## Monitoring and Enforcement Challenges

Instance: A 2023 study in industrial zones of Haryana found that manual monitoring allowed approximately 22% of waste transporters to deviate from authorized disposal routes without detection.



## Transparency and Accountability Issues

Instance: In 2022, the National Green Tribunal noted that only 11% of industrial pollution data was publicly accessible in comprehensible formats across most states.



## Operational Inefficiencies

Instance: Rajasthan reported backlogs of up to 4-6 months in processing industrial consent applications due to manual processing systems.



## Coordination Failures

Instance: A NITI Aayog assessment found that only 17% of industrial waste management data was effectively shared between central and state pollution control boards when using non-digital systems.



## Need for a Digital Platform

To streamline the issuance of No Objection Certificates (NOCs), track waste disposal, and ensure environmental compliance, CECB partnered with CSM Tech to design and implement the Industrial Waste Management and Monitoring System (IWMMS)-a centralized web and mobile-based solution. The digital system aims to:

- Simplify the application and approval processes for industrial waste NOCs
- Enable real-time tracking of waste movement using geo-fencing
- Digitally document and monitor every phase of industrial waste disposal
- Improve transparency, accountability, and enforcement through data analytics

## Challenges Faced

Prior to IWMMS, the system was hindered by:

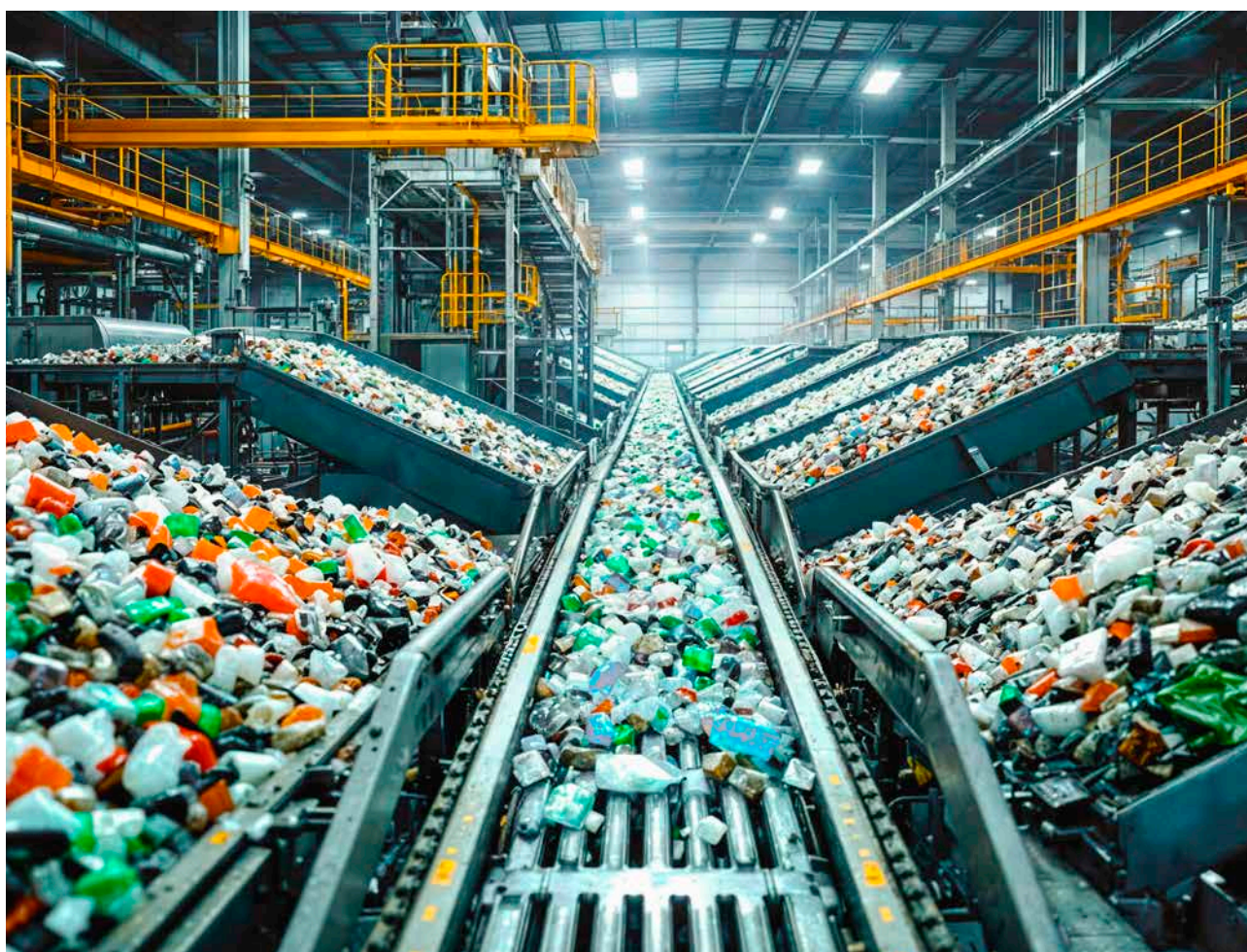
- Manual, paperwork-heavy processes causing delays
- Lack of real-time visibility into waste transportation and disposal
- Risk of non-compliance and data manipulation
- No centralized platform for coordination between industries, regional officers, and disposal sites
- Poor tracking of re-user industries and coal mine backfilling activities



## About the IWMMS Solution

IWMMS is an integrated web and mobile-based platform that digitizes the entire lifecycle of industrial waste—from unit registration and NOC approval to real-time trip monitoring and final disposal at landfills, reuse centers, or coal mines. It empowers industries and regulators to operate within a structured, accountable ecosystem. It comprises of :

- A centralized web platform for NOC applications, approval workflows, reporting, and data analytics
- An Android-based mobile application for ground-level tracking by loaders, drivers, re-users, and coal mine in-charges
- Integrations with Aadhaar, PAN, Vehicle Tracking System (VTS), and GIS for robust verification and monitoring
- A configurable backend engine enabling scalability and modular upgrades



# Key Features



## Real-Time Waste Tracking:

Monitors waste generation, transport, and disposal with complete traceability and GPS-based geo-fencing.



## Mobile App Integration:

Android app enables loaders, drivers, and re-users to capture images, update status, and complete disposal trips in real-time.



## Online NOC Management:

Industries can self-register and apply for NOC digitally. Regional Officers approve or reject applications through an automated workflow.



## Role-Based Access:

Secure, configurable user roles for industries, contractors, drivers, loaders, ROs, and CECB officials ensure accountability.



## Seamless Disposal Workflow:

Enables trip creation, assignment of vehicles and personnel, and ensures disposal at authorized locations only.



## Compliance & Alerts:

Built-in alerts and compliance checks notify users of anomalies, missed trips, or violations.



## Real-Time Dashboard & Reports:

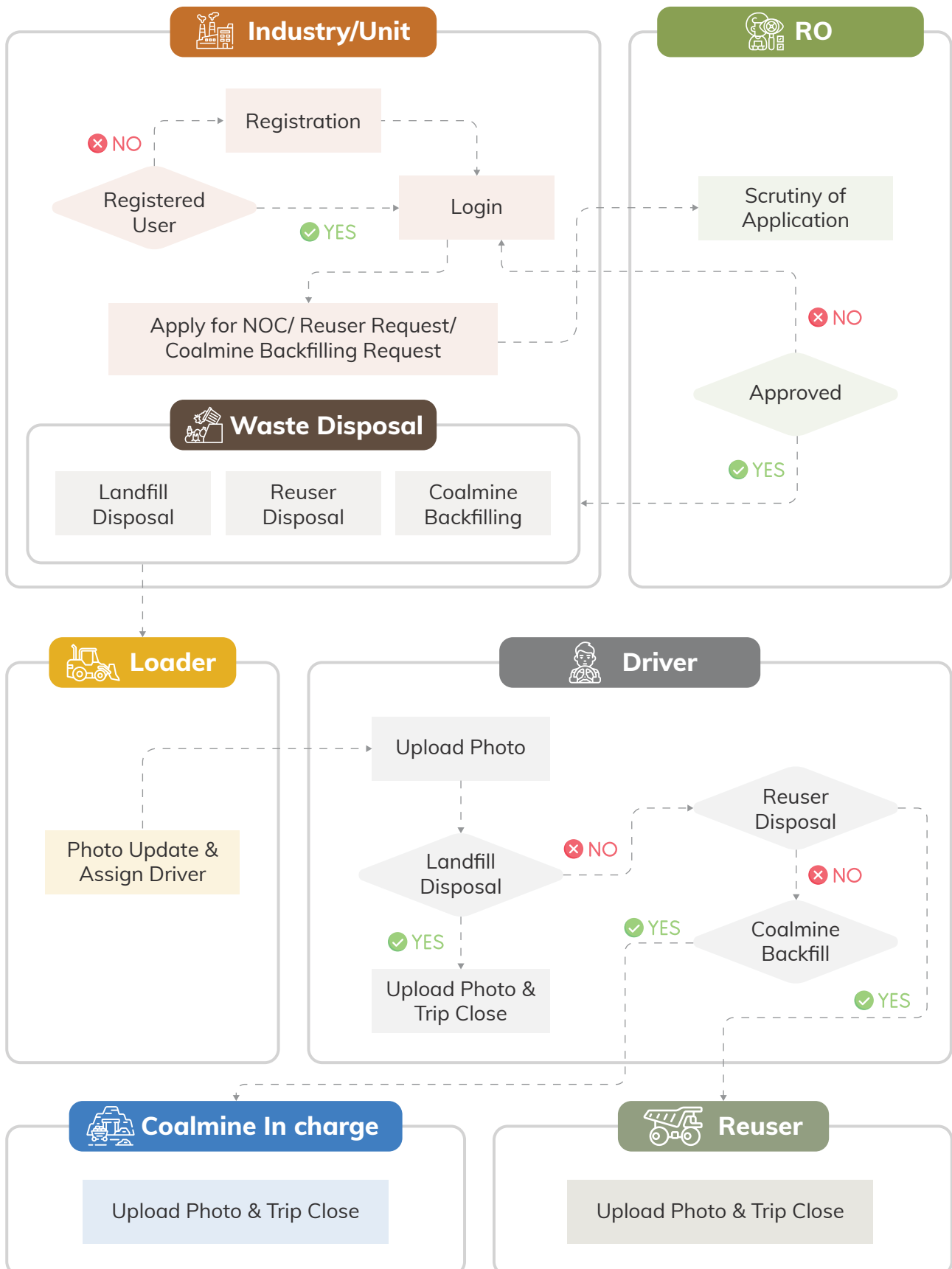
Visual dashboards and automated reports for quick insights into waste volumes, NOC statuses, and operational efficiency.



## System Integrations:

Seamless integration with Aadhaar, PAN, VTS, and SMS for validation, tracking, and real-time communication.

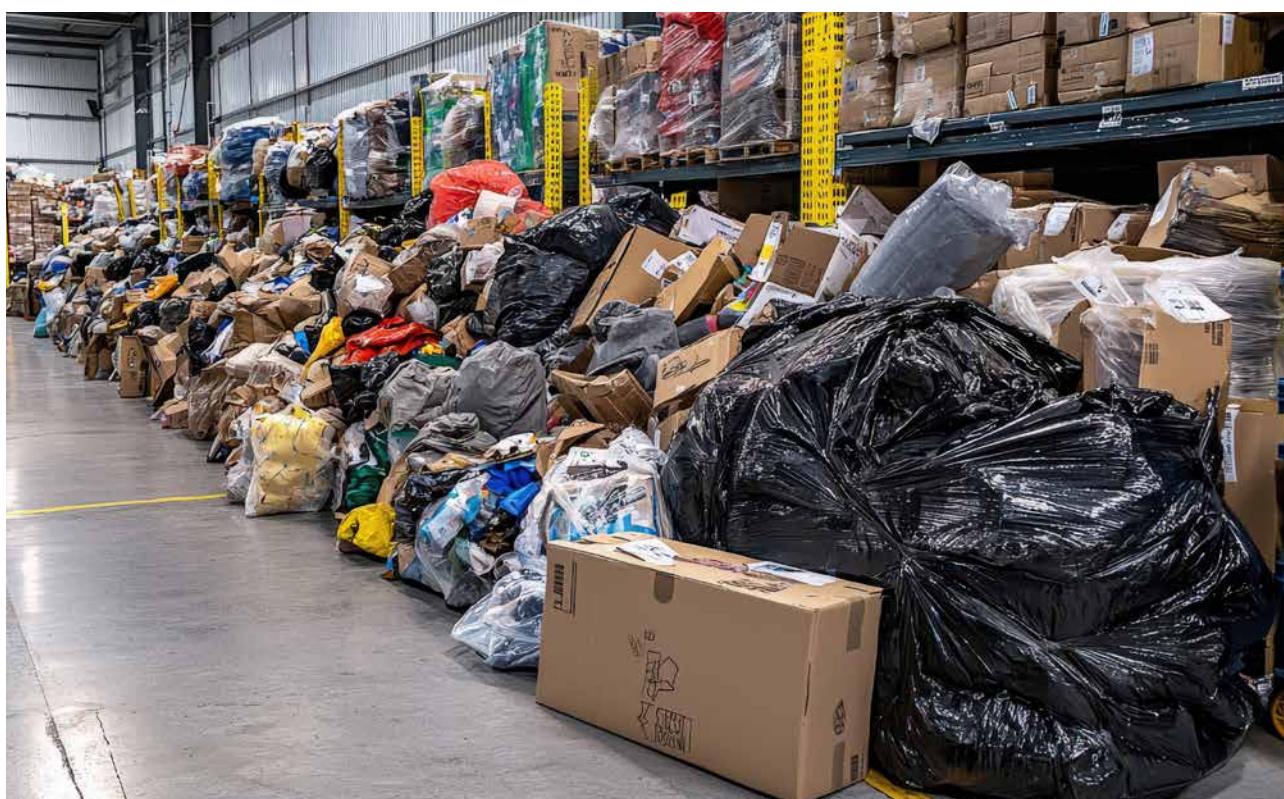
# Process Flow





## Unique Selling Propositions (USPs)

- Geo-fencing Compliance: Prevents unauthorized disposal
- Mobile-first Monitoring: Ground-level data capture ensures traceability
- Seamless Integrations: Aadhaar, PAN, VTS, SMS – for end-to-end digitization
- Data-Driven Decision Making: Built-in analytics empower enforcement and policy planning
- Transparency & Accountability: Eliminates manual loopholes and enforces audit trails



## Benefits

- Faster NOC Approvals: Reduced turnaround time and elimination of paper trails
- Increased Compliance: Real-time alerts ensure industries and transporters follow norms
- Reduced Manual Intervention: Automation saves time and mitigates human error
- Scalable Architecture: Ready for expansion across more sectors and states
- Improved Coordination: Centralized system improves inter-department collaboration

## Impact

Land Filling	Statistics
NOC Received	339
NOC Pending	57
NOC Approved	199
NOC Rejected	26
NOC Reverted	57
Category-wise Landfill Disposal Quantity in tons	Statistics
Fly Ash	1218995.48
ESP Dust/Bag Filter Dust	44980.16
Total Quantity (Tons) of Waste Managed and Monitored	1264250.09
Overall	Statistics
No. of industries registered	95
No. of units registered	43
No. of trips created	44758
No. of trips closed	43494
Total reuser quantity disposed	1569355.98
Total coal mine backfilling quantity disposed	204433.79

## Conclusion

IWMMS has set a new benchmark in environmental governance by combining compliance with convenience. It ensures that industrial growth in Chhattisgarh remains sustainable, traceable, and environmentally responsible. With replicability potential across other Indian states, the solution stands as a blueprint for digital transformation in industrial waste management.



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