RFID based Waste Management System

WHITE PAPER

Ver 1.0 (March 2013)
Rapid increase in volume and types of solid and hazardous waste as a result of continuous economic growth, urbanization and industrialization, is becoming a burgeoning problem for national and local governments to ensure effective and sustainable management of waste. Waste management is a vital issue, particularly in relation to the environment. The costs associated with waste disposal can also be significant, particularly in densely populated countries. Market of waste management comprises of four segments municipal waste, electronic waste, biomedical waste and industrial waste. The Waste Management market is valued at INR 10 bn in 2008 and is expected to reach INR 27 bn in 2013. It is estimated that in 2004, the total amount of municipal waste generated will be 1.84 billion tones, an increase of around 7% on 2003.

It’s a challenge to properly manage the waste with most efforts being made to reduce the final volumes and to generate sufficient funds for waste management. If most of the waste could be diverted for material and resource recovery, then a substantial reduction in final volumes of waste could be achieved and the recovered material and resources could be utilized to generate revenue to fund waste management.

For waste management solutions providers and system integrators, focus on efficiency, economy, and traceability is critical. Radio frequency identification (RFID) is a powerful tool for waste collection, disposal, and management, delivering unique and compelling benefits to city governments, waste removal contractors, and their residential and commercial customers. The technology enhances the efficiency of waste management operations, and it supports environmentally responsible waste disposal policies and practices.

Mississippi County Tracks Waste Pickup

“Using RFID readers on trucks and tags on waste carts, Monroe County identified 600 customers who were receiving service without being billed.”

--RFID Journal, Sept. 30, 2009
Negative Impacts of Waste Management System

- Waste Management Agencies face a problem for *lost or stolen* inventory such as *garbage bins and specialty cans*, costing hundreds of thousands of dollars annually.

- Continually ascertain the routes assets such as *garbage trucks have traveled and where or not those assets have successfully picked up their receptacles*.

- **Increase in waste management costs.**

- **shrinking landfill space**

- Improper disposal of the wastes give *a dull and dreary look at the disposal site* besides devastating effect on the environment due to some non biodegradable wastes in nature.

- Improper methods of waste disposal *cause environmental pollution & directly or indirectly affects human, animal and plants life.*

Waste Management System

Waste Management cycle can be explained in 5 steps.

![Diagram of Waste Management Cycle](image)

*Figure 1: Waste Management Cycle*
Analysis

Waste Management Solution should consider following aspects

- The volume of waste generated.
- The equipment required for such a volume of waste being disposed off.
- A suitable service schedule.
- Knowledge of waste streams that are commonly disposed off.
- Identifying recycling opportunities.

Garbage Collection & Transportation Process

- Sorting at household level utilizing the existing plastic bags.
- The bags are closed with **Waste Identification Stickers (WIS)**.
- The bags are thrown into regular waste containers.
- The RFID tag is attached to the trash receptacle.
- A reader, antenna and scale are mounted on a garbage truck. The reader and antenna communicates with the RFID tags. **The RFID tag, located on the cart, transmits its unique ID.** The reader on the truck will receive this ID as each receptacle is emptied, weighs the bin.
- Data collected from the tags, which can be linked with a time stamp, type of container, weight of the container, truck’s identity, load description and customer information, can also be stored in the truck’s onboard computer and later transferred to a central waste management system for data processing or can be directly to a host computer.
Recovery Process

- The waste bags collected by trucks arrive at the recycling center.
- RFID detectors detect the types of waste bags.
- Robots pick, tear and empty the selected bags.
- The waste is conveyed into the appropriate containers/compactors.
- The torn bags are conveyed into the plastic bag container/compactor.
- The mixed waste is crushed and it ends up in the mixed waste containers/compactors.

Recycling or Disposal Process

- Recovered sorted items are packed for transportation.
- Recyclable items are sent to a recycling facility.
- Non-recyclable items or general waste is disposed at landfill.
Figure 2: Flow of Waste Management System
Benefits of using RFID in Waste Management

- **Easier recovery** of lost or stolen carts.
- **Easy accounting of travel routes** of garbage trucks and automatic recording for each individual cart pickup with no required driver interaction on pick-up route.
- **Cheaper, faster, more accurate data reporting.** No manual data-entry is required.
- Allows municipalities to monitor performance of sub-contractors.
- **Unprecedented degree of control and traceability** in disposing of hazardous or otherwise sensitive waste material.
- **Easier waste sorting** at household level.
- **Less collection points and containers** required on recycling.
- **Less cleaning and maintenance work** on recycling.
- On Recycling, **Improved rate on ‘waste-to-energy’**, spares natural resources.
- **Saves Waste Management Cost.**
- Incentive-based recycling programs that accurately reward customers for the amount they recycle, while **minimizing the amount of trash headed for the landfill.**
- **Improves the accuracy and efficiency** of bill-by-volume waste collection.
What IAITO can Provide

1. Understanding the requirement with end customer/partner.
2. Visiting the end customer/partner site and studying the system & IT Infrastructure with demo.

Why you should select IAITO Infotech as your partner

• We understand the RFID Technology, Solution and have knowledge of the Industry with the top Notch IIT Kanpur R&D engineers who are having more than 5+ years experience in the same domain.

• Our understanding about the RFID Business Values & ROI Realization is with 15+ years experience business people in team.

• We provide High Quality Product & Testing process (ISO 9001: 2008 Certified Company).

• We Have High Techno Commercial viability – ROI.

• Indigenous Setup (Design, Developed & Tested in world class RFID lab of IIT Kanpur).

• We have Local Support & Strong Partner Network Framework to ensure better support.
Conclusion

With costs rising at all points in the waste management process, shrinking landfill space, and growing consumer interest in recycling, RFID is enabling cities and towns across the country to foster recycling while improving the efficiency of their waste operations. Automated accuracy in all aspects of collection and disposal is a primary reason for the recycling and waste industry is adopting RFID. RFID bridges the gaps to IT systems that were previously bridged by manual data entry.

About IAITO INFOTECH PVT LTD (ISO 9001:2008 certified) an incubate company of IIT Kanpur provides state of the art integrated traceability, identification and authentication solution. It provides software as well as integrated turnkey solution of both(hardware, software & services) in various technologies like RFID, NFC, GPS, Mobile technologies etc.

With the knowledge of experienced professional, we are able to help you to deploy right combination of technology that will maximize your ROI right from start and ensure its expandability as the application grow through the evolution of the technology.

With our R & D experienced team, we have developed different integrated solutions for various industries and carry one of the most comprehensive product/solutions.

IAITO’s turnkey solutions model covers industries like Aviation, Manufacturing, Transportation, Retail, Government, Renewable Energy, BFSI and Mining.

For more information kindly visit our website http://www.iaito.co.in/

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