

15th IconSWM-CE & IPLA GF 2025



Zero Waste and Circular Economy 2025

Editor-in-Chief

Prof. Sadhan Kumar Ghosh

Editors:

**Prof. Narpinder Singh,
Dr. Gopalji, Dr Manavendra Singh,
Dr. Rachn Karmakar, Dr Sutripta Sarkar,
Dr Ipsita Saha, Dr Debasis Mitra, Prof Rahul Baidya
Assistant to Editor-in-Chief: Mr. Dineshkumar M**

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**Graphic Era (Deemed to be University), Dehradun, India
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IPLA (A SDG Partnership)**

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Award Listing	Diamond Award	Platinum Award	Gold Award
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Category 2: TSR % in 2020-2024 (5 years)	Nuvoco Vistas- Chittor Cement Plant, Rajasthan	MP Birla- Chanderia Cement Plant, Rajasthan	--
Category 3: NRPW utilized in 2024 (tonnes)	Adani- ACC Chanda Cement Plant, Maharashtra	JSW- Nandyal Cement Plant, Andhra Pradesh	Nu Vista (Nuvoco)- Risdha Cement Plant, Chhattisgarh
Category 4: NRPW utilized in 2020-2024 (5 years) (tonnes)	MP Birla- Chanderia Cement Plant, Rajasthan	--	--
Category 5: AR utilized in 2024 (tonnes)	Adani- Marwar Mundwa Cement Plant, Rajasthan	Nu Vista (Nuvoco)- Risdha Cement Plant, Chhattisgarh	JSW- Shiva Cement Plant, Odisha

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Award of Appreciation for the Significant Support to ISWMAW Initiatives	Dr. Mitali Ghosh Bakshi
Award of Appreciation for his continued support in the IconSWM-CE Excellence Award Scheme for Coprocessing	Mr. Palash Kumar Saha

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Deep Learning–Driven Automated Classification and Segregation of Food Waste for Circular Economy Application

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ABSTRACT: In order to facilitate value-oriented recycling within the framework of a circular economy, this study proposes a deep learning-based system for the automated classification and segregation of food waste. Fruit peels, vegetable residues, bones, dairy, oils, and other organic materials are among the different kinds of food waste that are automatically recognized and categorized using computer vision models. Each item is subsequently routed to the proper recycling stream—composting, fermentation, anaerobic digestion, oil recovery, or landfill diversion—by a post-processing layer. To increase domain specificity, the framework is trained using publically accessible datasets (Fruits360 and TrashNet) supplemented with unique food waste photos. Classification performance is greatly improved by using MobileNetV2 as a feature extractor in conjunction with transfer learning. During model training, the system makes use of binary cross-entropy loss and the Adam optimizer. Accuracy, F1-score, and confusion matrix analysis are used to evaluate the model. In addition to classifying and separating garbage, the system determines and forecasts how much of each sort of waste is needed for particular agricultural uses. It produces a minimum of three waste ratio combinations, showing either mixed or individual proportions along with their suggested recycling processes. In order to facilitate effective trash sorting, lower contamination, and encourage sustainable resource recovery, the finished trained model is stored and ready for practical implementation.

Keywords: Food Waste Classification; Transfer Learning; Circular Economy; MobileNetV2; Recycling Pathway Prediction.

A Review on the Use of Artificial Intelligence for the Development of a Smart City through Integrated Waste Management system and Circular Economy

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ABSTRACT: Smart City development with circular economy requires an integrated waste management system and can be ensured through the use of smart technologies like integrating the city waste management facilities through IoT and artificial intelligence. This is done through use of real time bin monitoring by smart sensors, using artificial intelligence-based route optimization for waste collecting trucks, use artificial intelligence in various aspects of waste management like segregation of wet, dry and hazardous waste at source, composting, recycling, waste to energy facilities and using predictive analytics for optimum resource and infrastructure planning. The objective of smart city with integrated waste management is to use holistic approach in reducing the volume of waste, increase resource recovery, and bring overall improvement in sustainability. Successful case studies from around the World like San Francisco and Los Angeles from USA; Singapore; Msheireb Downtown from Doha, Qatar; Barcelona from Spain and Indore from India were discussed to emphasis on the role of integrated waste management in making cities smart and sustainable. Life cycle assessment must be carried out for every product and services provided, so that the assessment of environmental impacts of the products and services can be done. Circular economy provides solutions for these environmental impacts.

Keywords: Artificial intelligence, integrated waste management, route optimization, IoT sensors, circular economy.