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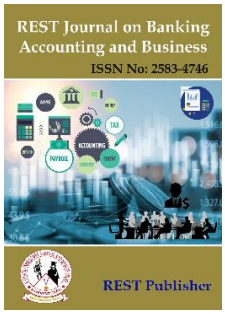

A study on restructuring plastic waste management post COVID in the wake of industry 4

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Abstract: *The COVID-19 pandemic has increased the confusions of waste management. Our fear towards the disease has forced us to shift to the usage of personal protective equipment and the usage of disposable equipment. The issue connected with the existing system has compelled us to change to a new process. Change in implementing environment oriented substances like bio plastics and coming with sustainable technologies are very much needed to fight future pandemics. The idea to promote a sustainable plastic waste management technology as well as to decrease plastic pollution can be achieved by giving priority to our systems to bring changes in personal and institutional policies. Coming up with measures that are encouraging circularity and sustainable practices and private-public investments in infrastructure, researches are helping in bringing the upcoming changes. To address the difficulties posed by the current methodologies, it is imperative to build efficient waste management systems using cutting-edge technologies. Artificial intelligence (AI) has emerged as an important technology with lot of functions. Studies have also documented the use of AI methods for solid waste management. The most current developments in the use of AI approaches for solid waste management are reviewed critically in this article. The important barriers that are avoiding AI from its usage in waste management are highlighted. These include the lack of reproducibility, the choice and accessibility of pertinent data, and the paucity of applications in actual solid waste. Suggestions for work in the future are done on the basis of the loopholes already studied. All parties involved in the solid waste management industry, such as policymakers, governments, waste management companies, municipalities, and researchers can gain from this review.*
Keywords: *Waste Management, COVID-19, shift, sustainable technologies, Artificial intelligence, plastic pollution.*

1. INTRODUCTION

Generation of solid waste has come up marvellously due to the rapid growth in industries and the increasing population (Hossein et al., 2022; Lu and Chen, 2022). Solid waste may be produced during the manufacturing process or after a product has been used in the construction, industrial, commercial, or residential sectors. According to Abdel-Shafy and Mansour (2018), "municipal waste"means a mix of "rubbish,""human waste ,""animal waste"etc. Typically, it is produced as glass, plastic, biological material, and metal. Between 7 and 9 billion tonnes of solid trash are created year globally, with municipal solid waste accounting for around 2 billion tonnes of the total solid waste produced in 2016 (Chen et al., 2020; Wilson and Velis, 2015). According to past studies, the population's quick growth, rising industrial activity, and quickening urbanisation affect the amount of municipal solid waste (MSW) produced by a factor of 2.6 (Tan et al., 2014; Tozlu et al., 2016). According to a recent prediction, the globe would create 2.59 and 3.40 billion tonnes of MSW by the years 2030 and 2050, respectively (Kaza et al., 2018). First off, despite the widespread belief that plastic is bad, it actually harms the ecosystem due to poor resource management and management practises (Borg, 2020). The flexibility, toughness, water resistance, and low cost of plastics, however, have fueled scientific and technical advancements in every conceivable field (UNCTAD, 2018). Their value may be seen in the way they safeguard the public's health and the health of the front-line medical personnel dealing with the epidemic. One of the key elements of current medical equipment and protective gear is plastic. Mixed plastics, such as those found in single-use masks that have layers of plastic layered with other materials, offer a greater environmental danger since they are less likely to be recycled (Tenenbaum, 2020). Effective MSW management requires appropriate transportation, disposal, and infrastructure (Ulgiati and Zucaro, 2019).In addition, there are a number of other challenges to effective MSW management in developing nations. These include: a) improper landfill disposal;

b) insufficient recycling activity use; c) improper handling of non-industrial hazardous waste; d) improper service provision; and e) improper service operation. Predictive models have tended to favour artificial intelligence (AI) applications more and more recently as a result of extraordinary data availability and technological breakthroughs. In order to solve difficult engineering problems that have a large number of input/random variables, AI-based approaches are computationally created to achieve genuine human thinking or cognitive skills (Wang et al., 2015).AI techniques have been shown to be useful in a number of fields, including water treatment, the medical sciences, and geosciences (Alam, 2022; Alam et al., 2022; Bugaets et al., 1991; Haleem et al., 2019; Naeem et al., 2020). AI has become a well-liked method for anticipating MSW in recent years.

Statement of the Problem: Waste management is one of the crucial problems faced by Indian cities post covid. Many of them are trying for solutions to dispose solid waste without causing harm to the environment.The traditional methods of waste management no longer seems to be a solution for the problems of the Indian cities.

Scope of the Study : Since the study has been conducted by collecting data from the prominent cities in India it is having wide scope.

2. REVIEW OF LITERATURE

In numerous nations, the fear brought on by the corona virus has resulted in irrational stockpiling of groceries and other household necessities, creating an unfavourable demand for packaged goods with lengthy shelf lives (Sharma et al., 2020). Two of the important consumer behaviour thresholds connected to pandemic panic shopping are proactive health-mindedness and reactive health management, in particular. Online shopping and e-commerce have de facto replaced other methods of doing business due to the pandemic, notwithstanding ongoing difficulties (WTO, 2020). Amazon's e-commerce services saw a 26% increase in year-over-year revenues in the first quarter of 2020 despite high operational costs, the hiring of new workers, and higher costs for safety precautions (Amazon Press Release, 2020). In South Korea, the COVID-19 epidemic was said to have increased internet purchases of food and other needs by 92.5% and 44.5%, respectively, compared to last year (Hyun, 2020). According to the survey, internet buying increased by 12–57% in nations including Vietnam, India, China, Italy, and Germany within the same time period. According to Rakuten Intelligence, a market research company, online shopping in the United States increased by 50% between March and mid-April compared to the yearly growth rate of 20% (Rattner, 2020). The predominance of single-use plastic packaging in e-commerce will result in the accumulation of low-recyclability plastic waste, including thin films, foam, and multi-layered plastic (UNEP, 2018). Artificial neural networks (ANN), support vector machines (SVM), decision trees (DT), genetic algorithms (GA), K Nearest Neighbour (kNN), and numerous other ensemble learning techniques have all been used in research for predicting and identifying the disposal of municipal solid waste (Abbasi and El Hanandeh, 2016; Ayeleru et al., 2021; Kannangara et al., 2018; Nguyen et al., 2021; Wu et al., 2020).Although some review articles on the use of AI techniques in waste management have previously been published (Abdallah et al., 2020; Guo et al., 2021), recent technological advancements make it necessary to present an up-to-date overview of the current state of research on this topic. Municipal solid waste includes all types of solid waste, including household, social, business, building, and organisational garbage (Sipra et al., 2018). The dynamics and complexity of the problem are exacerbated by the several difficulties that currently confront municipal solid waste management strategies, including urbanisation, climate change, and rapid population expansion. Inappropriate disposal of MSW can lead to unsanitary conditions, and these conditions can spark the production of dangerous waste and environmental degradation.Researchers have employed AI-based algorithms for solid waste optimisation and prediction in the literature (Abbasi and El Hanandeh, 2016; Abdallah et al., 2020). The goal of solid management is to maximise a number of process-related tasks, including solid waste detection, collection, garbage can placement, transportation along the shortest routes, and disposal. For the purpose of creating a successful waste management plan, accurate forecasting of municipal solid waste is crucial. For solid waste optimisation and prediction, researchers have used AI-based algorithms in the literature (Abbasi and El Hanandeh, 2016; Abdallah et al., 2020). Maximising a variety of process-related duties, such as garbage identification, gathering, can location, shipment along the fastest paths, and removal, is the aim of garbage management.Numerous studies in recent years have reported the use of various machine learning -based approaches in waste management for forecasting and optimised performance of the the identification, gathering, categorization, and attributes of trash from municipalities (Dai et al., 2011; Ramasami and Velumani, 2016; Shyam et al., 2017). Future developments in AI could revolutionise garbage management.

Objectives of the Study

- To find out whether waste management and population are related.
- To know the relation between the quantity of waste generation and its destruction.

- To study whether artificial intelligence provides a better solution than the traditional methods of waste disposal.
- To study whether corporates have a better solution for waste disposal.
- To find out whether AI based waste management is cheaper for India.

To examine whether AI based waste management can be successfully implemented in Indian cities.

3. RESEARCH METHODOLOGY

Sampling design: The sampling plan used is random sampling. In addition to secondary data, the researcher has also gathered primary data. Through the use of questionnaires and in-person interviews, primary data was gathered. Secondary information was gathered online, from books, and from journals.

Sample Size: 400 respondents made up the sample size employed by the researcher. This was accomplished by gathering data from responses in various Indian cities.

Method of Analysis: The researcher has carried out a descriptive study by administering questionnaire among the respondents. The replies had been recorded and an empirical study had been conducted. The findings were assessed and recorded.

4. ANALYSIS AND INTERPRETATION OF DATA

In this chapter first analysis was conducted to study the relationship between waste management and population. Finally the researcher made a study regarding the successful implementation of AI based waste management in Indian cities. The findings are presented here and their interpretations are based on the collective information of the sample firms cities rather than individual firms.

Table 1. Percentage of the connection between garbage management and population

Particulars	No of respondents	%
Garbage management becomes more hectic with the increase in population.	251	62.75
Garbage management is much easier with a controlled population.	149	37.25

(Source : Primary Data)

As shown in table 1 251 out of the total 300 respondents(ie 62.75%) are of the opinion that garbage management becomes more hectic with the increase in population where as only 149 respondents (ie 37.25%) are of the opinion that garbage management is much easier with a controlled population. From this we can infer that waste management becomes more hectic with the increase in population.

Table 2. Relationship between amount of waste generation and its disposal

Particulars	No of respondents	%
The disposal of waste in prominent Indian cities is difficult	321	80.25
The disposal of waste in small cities is easier	79	19.75

(Source : Primary Data)

As shown in table 2 321out of the total 400 respondents (ie 80.25%) are of the opinion that the disposal of waste in prominent Indian cities is difficult where as only 79 respondents (ie 19.75%) are of the opinion that the disposal of waste in small cities is easier.

Opinion of the corporate regarding waste disposal

Table 3. Opinion of the corporate regarding waste disposal assessed by respondents with mean score and test of significance

	N	%	Mean	SD	t	Sig.
Strongly Disagree	3	0.75	4.02	1.19	17.045	0.000
Disagree	86	21.50				
Neither agree or disagree	4	1.00				
Agree	116	29.00				
Strongly agree	191	47.75				
Total	400	100.00				

(Source : Primary Data)

The above table shows the no of respondents who agree that corporate can have a better solution for waste disposal were 116 and the no of respondents who strongly agree were 191. The mean obtained was 4.02, standard deviation was 1.19 and the t value obtained was 17.045. The mean score obtained in this case was 4.02. The mean score obtained is significantly higher than the mean of the response scales as the significance level of t value obtained was less than 0.05.From the outcome, it can be concluded that the corporate can have a better solution for waste disposal.

Summary of Findings:

From the above analysis & interpretation of data the researcher found the following summary of findings :

- 62.75percent of the respondents are of the opinion that waste management becomes more hectic with the increase in population where as only 37.25%are of the opinion that waste management is much easier with a controlled population.
- 80.25% are of the opinion that the disposal of waste in prominent Indian cities is difficult where as only 19.75% are of the opinion that the disposal of waste in small cities is easier.
- 62.5% of the respondents believe that artificial intelligence provides a better solution than the traditional methods of waste disposal where as 37.5% of the respondents believe that artificial intelligence does not provide a better solution than the traditional methods of waste disposal.
- 70% of the respondents are of the opinion that corporate have a better solution for waste disposal where as only 30 % of the respondents are of the opinion that corporate does not have a better solution for waste disposal.
- 66.3% of the respondents believe that artificial intelligence based waste management is cheaper for India where as 43.7 % of the respondents believe that artificial intelligence based waste management is not cheaper for India.
- 56.3% of the respondents are of the opinion that AI based waste management can be successfully implemented in Indian cities where as 43.7 % of the respondents are of the opinion that AI based waste management cannot be successfully implemented in Indian cities.
- So taking into consideration all these points we can say that waste management is one of the crucial problems faced by the prominent Indian cities. Artificial intelligence provides a better solution than the conventional trash disposal techniques.

A null hypothesis is framed as “AI based waste management cannot be successfully implemented in Indian cities”. Chi square test shows that null hypothesis is rejected. Therefore we can conclude that AI based waste management can be successfully implemented in Indian cities.

5. CONCLUSION

Many AI models (both single and hybrid) have previously shown promise in the optimization and prediction of multiple solid waste formation, detection, collection and property. The creation of smart solid waste management systems for cities will be a great way to effectively manage the generated solid waste. AI approaches have the capacity to forecast the effects of SW on the environment and identify whether waste is suitable for the recovery of various old materials from it.

REFERENCE

[1]. Abdallah Artificial intelligence applications in solid waste management: a systematic research review Waste Manag.(2020)
[2]. Abdel-Shafy Solid waste issue: sources, composition, disposal, recycling, and valorization. Egypt J. Petrol.(2018)
[3]. Ahmadi *G* Application of an artificial intelligence technique enhanced with intelligent water drops for monthly reference evapotranspiration estimationAgric. Water Manag.(2021)
[4]. Alam G Applications of artificial intelligence in water treatment for optimization and automation of adsorption processes: recent advances and prospectsChem. Eng. J.(2022)
[5]. Alidoust PPrediction of the shear modulus of municipal solid waste (MSW): an application of machine learning techniquesJ. Clean. Prod.(2021)
[6]. Ayeleru O.O.Forecasting municipal solid waste quantity using artificial neural network and supported vector machine techniques: a case study of Johannesburg, South AfricaJ. Clean. Prod.(2021)
[7]. Beigl . *P* Modelling municipal solid waste generation: a reviewWaste Manag.(2008)
[8]. Bilal M .Big data architecture for construction waste analytics (CWA): a conceptual frameworkJ. Build. Eng.(2016)
[9]. Birgen N Machine learning based modelling for lower heating value prediction of municipal solid wasteFuel(2021)

[10]. Chartier Yves, Emmanuel J., Pieper Ute P.A., Philip R., Ruth S., William T., Wilburn S., Zghondi R. WHO; 2014. Safe management of wastes from health-care activities. https://apps.who.int/iris/bitstream/handle/10665/85349/9789241548564_eng.pdf?sequence=1
[11]. Chidepatil A., Bindra P., Kulkarni D., Qazi M., Kshirsagar M., Sankaran K. From trash to cash: how blockchain and multi-sensor-driven artificial intelligence can transform circular economy of plastic waste? *Administrative Sciences*. 2020;10:23. doi: 10.3390/admsci10020023. [CrossRef] [Google Scholar]
[12]. Climate Action Tracker A government roadmap for addressing the climate and post COVID-19 economic crises (issue June 2019) 2020. https://climateactiontracker.org/documents/706/CAT_2020-04-27_Briefing_COVID19_Apr2020.pdf
[13]. Chidepatil A., Bindra P., Kulkarni D., Qazi M., Kshirsagar M., Sankaran K. From trash to cash: how blockchain and multi-sensor-driven artificial intelligence can transform circular economy of plastic waste? *Administrative Sciences*. 2020;10:23. doi: 10.3390/admsci10020023. [CrossRef] [Google Scholar]
[14]. Heidbreder L.M., Bablok I., Drews S., Menzel C. Tackling the plastic problem: a review on perceptions, behaviors, and interventions. *Sci. Total Environ.* 2019;668:1077–1093. doi:10.1016/j.scitotenv.2019.02.437. [PubMed] [CrossRef] [Google Scholar]
[15]. Herron J.B.T., HayDavid A.G.C., Gilliam A.D., Brennan P.A. Personal protective equipment and Covid-19- a risk to healthcare staff? *Br. J. Oral Maxillofac. Surg.* 2020;58:500–502. doi: 10.1016/j.bjoms.2020.04.015. [PMC free article] [PubMed] [CrossRef] [Google Scholar].

