

## INNOVATIVE AND MODERN APPROACHES (BLOCK CHAIN AND ARTIFICIAL INTELLIGENCE) FOR GARBAGE COLLECTION AND MANAGEMENT-A REVIEW

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### ABSTRACT

Every human activity creates waste in one form or the other. Due to population increase and unplanned urban development, unlike in the past, a slight mismanagement of waste will invariably damage human health and environment. Most of the technological options put forward for waste treatment and disposal are either impracticable due to many reasons or just transform waste from form to the other. All success stories of Municipal Solid Waste Management may be traced to public participation. Rapid urbanization and increased population density, coupled with improper waste management, make the Trivandrum district, located in the southern tip of India, a breeding place for a variety of life-threatening, rare diseases. It is reasonably suspected that mismanaged solid wastes are directly or indirectly responsible for this situation. Undoubtedly, these life-threatening diseases will crumble the economic backbone of thousands of poor people living in the State. Hence, technology interventions which focus on developing innovative conceptual framework for solid waste management have become the need of the hour. Innovations which employ artificial intelligence and block chain will help in proper solid waste management thereby enable efficient policy framework by concerned authorities. The review is an effort to understand how cities across the globe handle solid waste management issues and the conceptual framework undertaken by different governments worldwide. In this paper, we have analyzed the existing block chain based technologies for waste management and how effective these solutions are in addressing the challenges of waste management sector that faces today.

**KEY WORDS:** Artificial Intelligence, Block Chain, Policy framework, Solid Waste Management

### INTRODUCTION

Municipal Solid Waste dumping in public places is one of the significant problems faced by the society nowadays. Rapid urbanisation and population growth is the main cause of increase in unwarranted dumping of municipal solid waste. Integrated Solid Waste Management refers to selection and use of appropriate management programs, technologies and techniques to acquire waste management goals, and objectives.

Also, about half of the waste obtained is

generated in cities and half quarter of that waste is collected from rural areas. Literature survey suggests that effective solid waste management programs are urgently needed in locations where land availability becomes a major constrain in proper segregation and management. Globally, the World Bank states that the solid waste increase by 70% by 2050 under a business scenario.

Despite the efforts by Ministry of Environment and Forests (MOEF) by implementing the Waste Management and Handling Rules in India, Municipal Solid Waste dumping in public places

still causes great adverse environmental and health impacts. The decomposition of solid waste liberates methane gas, which is one of the major contributors of global warming phenomenon. Major aim of this review is to generate ideas on waste management strategies and formulate adequate sustainable management practices with the help of latest technology available. The work will also investigate Systematic and Holistic approaches for waste management which are highly advanced and generate beneficial outcomes in future.

### REVIEW OF LITERATURE

In 1995 Integrated Sustainable Waste Management System was introduced to reform the older system which was not satisfied by the society, economy and Environment. (Van de Klundest, 1999). European Countries have already applied with various assessment and engineering tools and models to establish sustainable communities and also by effectively managing the resources and providing environmental protection in solid waste management system (Pires *et al.*, 2011). Asian Countries are also putting great effort in this field by implementary National legal frameworks by managing institutional, financial aspects and also by implementing public awareness and participation. (Shekdar, 2009)

According to the data from the developed Countries, the solid waste is mostly used in incinerated, Composed or Recycled than land filling. Due to the improper waste disposal it may lead to pollution. Pollution is a big threat to the whole living organisms (Morra *et al.*, 2009). Pollution may lead to the climate change and can cause destruction to the ecosystem and natural cycle (Raga *et al.*, 2001).

Economics and environmental aspects of the waste disposal option are always the massive issues in choosing the right technology (Aye and Widjaya 2006; Daskalopoulrs *et al.*, 1997), certain Asian countries still have some problems due to the unwarranted open dumping of municipal solid waste where as developed Asian countries such as Japan, Singapore, and South Korea are on the way to eliminate the land fill method (Agamuthu and Fauziah, 2010; Shekdar, 2009).

The most efficient disposal method for a developed country is Incineration in which the country posse's sufficient financial background and also accure energy recovery from the solid waste

(Papageorgiou *et al.*, 2009; Kleiss and Imura, 2006). Each technology has its Pros and Cons. According to the designing of waste disposal models and financial back ground of the Countries either (developed or developing one) the best disposal method determined for the particular company. To determine the best waste disposal option certain tools are to be analysed for example the life Assessment, it is most Feasible option for the Traditional market Waste Management in Indonesia, which Posses a Centralised plant for the Proper waste disposal (Aye and Widjaya 2006)

Other tools such as Multiple Criteria Analysis (MCA) and Cost Benefit Analysis (CBA) are used to estimate the accurate waste disposal options (Chung and Poon 1996). To estimate the efficient integrated technology in waste Management is the SWPlan software, calculated capital and management cost can be calculated. (Fauziah and Agamuthu, 2007).

Latest Block Chain Technology is an adequate technology for fast and secure network for transferring data and can produce accurate result in a comfortable platform. Block chain technology can be effectively implemented in the field of waste management sector and in waste tracking and rules enforcement field. Some observations analysed in block chain technology are transparency throughout the process, accountability, efficient data management, openness and wide security to data and spreading public awareness. An example for Block Chain Technology is Swachhcoin which manages wastes from residuals and industries thus converting them into economic and useful products. Materials like paper, steel, timber, precious metals, glass plastics are major by-products obtained from Swachhcoin. Swachhcoin which employs multiple cutting-edge technology comes under swachh ecosystem which is a Decentralised Autonomous Organization (DAO). Recereum and plastic bank are some of the technologies by block chain. (Preethi *et al.*, 2019)

As per literature records, latest technology which uses Artificial intelligence, also called as machine intelligence can be wisely applied to a variety of Waste Management applications thereby reducing labor cost, enabling waste segregation at source, improving the quality of waste, reducing costs incurred in water treatment process, tracing unwarranted dumping of Solid waste and also helps in face recognition of the victim.

Technological advancements by using emitted

sound waves and applying Artificial Intelligence (AI) has the ability to segregate the plastics, metal, glass products (Gutierrez *et al.*, 2015). In the field of machine learning many companies have established the waste recycling robots for segregation purposes. Potential companies like Zen robotics, Bio Hi-tech, and Intel produced feasible and time efficient automated waste cleaning robots for easy segregation (Tarbell *et al.*, 2010).

### CONCLUSION

For any developing city or township with exponentially increasing population, waste generation, implementation of proper storage, essential collection machines, and proper disposal methods are always challenging. As more and more waste is generated yearly, it is evident that this increasing trend is unacceptable in the long run. So safer and more sustainable approaches, which helps in improving the available waste management strategies has to be considered. According to the current data the world generated about 2.01 billion tonnes of municipal solid waste a year. About 33% of the waste is managed safe in environment. With advancements in the field of technology and Artificial Intelligence evolving as a major solution for every environment related problem, technological aid must be sought for developing strategies which aid in waste management and hence develop a sustainable future.

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