

Mathematical Modelling Apply For Inventory & Recycling Product Management

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Abstract:

The goal of this study explores solid waste and inventory management and its crucial role in providing renewable resources like recycled materials, fuel, and energy. It introduces a Innovative mathematical model for an integrated solid waste and inventory Product integrated with minimize costs, save time and save energy and environmental impacts while maximizing energy recovery. Implemented as a Linear programming/ Assignment modeling, it efficiently addresses these goals using a Excel solver solution algorithm. Validation with real case study data confirms the effectiveness of the mathematical model and develop new algorithm, with comparative analysis highlighting the superior performance in reducing total costs and environmental impacts as well as increase the efficiency of work.

Keywords —Artificial Intelligence, Machine Learning, Recycling Product, Waste Management, Sustainability.

I. INTRODUCTION

Now a day waste Management is very essential parts for our society as well as our life System for removing recyclable items from material recovery facilities using the Waste Management Model. It is then necessary to determine how to dispose of the segregated waste after it has been properly separated. Waste can be processed and treated in a variety of ways. According to its nature, waste can be reused, recycled, used for energy recovery, used for resource recovery, etc.

It is the next step of this research paper to determine the relevant parameters of this distinct system and to develop a different kind of model as well as to determine its accuracy, speed, and durability. Different type of algorithms^{5,6} to manage how to perform the work efficiency and different approaches will be useful for system. Finally we will develop futuristic models for waste management & Recycling inventory item along with futuristics approach shown by Statistical method like graphical as well as pie chart. Different Innovative ideas^{7,8} create Waste operating system use in machine algorithm to improve system flexibility. Expected Outcome

must be improves Financial economic growth and also increased reliability, durability and reversible path loop can be accessed .

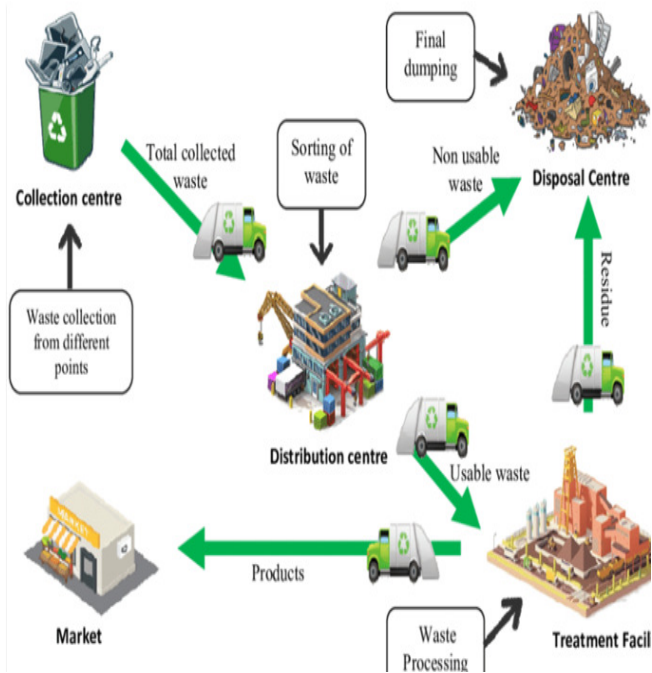
1.2 Different kinds of Waste Management:

- a. Reduce
- b. Reuse
- c. Recycle
- d. Recover
- e. Residual management.

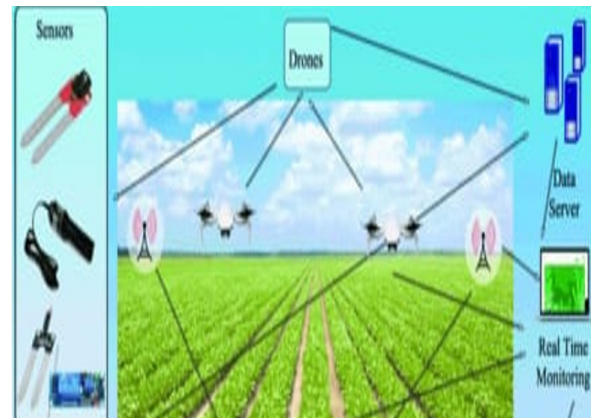


Major Four Types of Waste:

For the purposes of this review these sources are defined as giving rise to four major categories of waste: municipal solid waste, industrial waste, agricultural waste and hazardous waste. Each of these waste types is examined separately below.



Reinforce Waste Management Decisions:

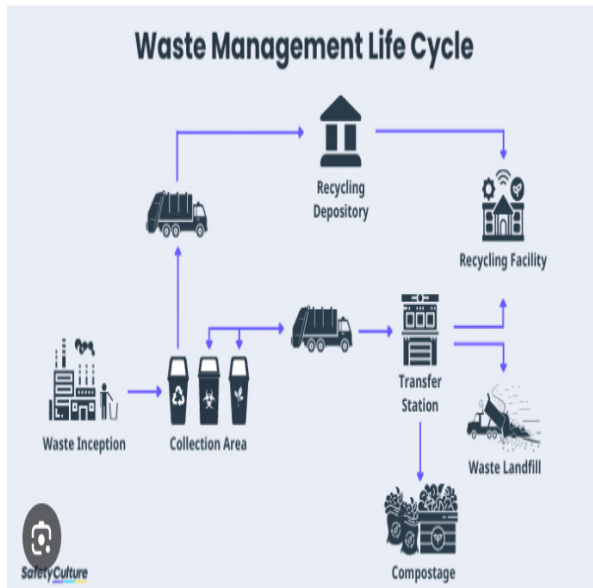


How we will control the wastage Product :-

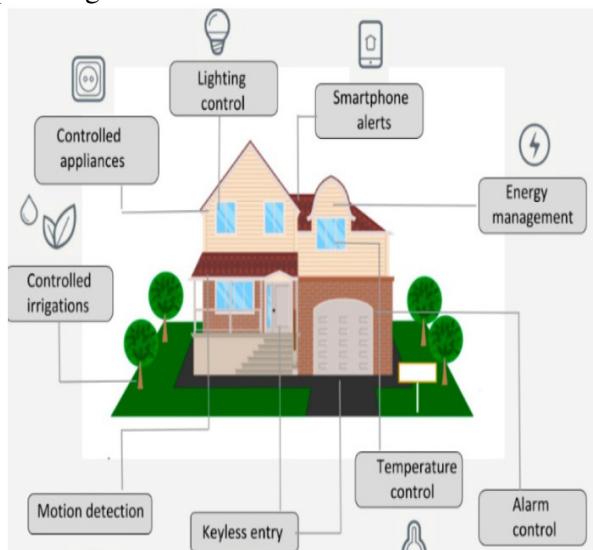
Implementing strategies to control waste involves several key steps:

- ❖ Establishing recycling and reuse programs to divert waste from landfills.
- ❖ Conducting regular waste audits to identify sources and opportunities for reduction.
- ❖ Providing employee training on waste management practices, including sorting and reduction techniques.
- ❖ Establishing monitoring systems to track waste generation and progress toward reduction goals.
- ❖ Continuously evaluating and refining practices based on feedback, technology, and regulations. By doing so, you can effectively minimize the environmental impact of waste products.

How we will start the process: Over their lifespan, goods and services can have diverse environmental effects. Waste Management Life Cycle Thinking considers these impacts from product inception. Waste Management Life Cycle Assessment measures emissions, resource use, and environmental pressures linked to a product. It encompasses extraction, manufacturing, distribution, and disposal. The goal is minimizing environmental impacts, considering trade-offs without shifting problems. Improving production might inadvertently increase impacts elsewhere, requiring careful evaluation of waste management options.



Futuristic Prediction Approach in Mathematical Model :What kind of benefits can our lives get if we control waste management?We can see in the picture given below



RESULTS: The case Study and its Mathematical Model: The new technique method is used to solve a problem for our case study. The algorithm is summering by following.

Table 1

Waste Disposal	Types of Waste(Tonne)				
	Municipal Solid Waste	Industrial Waste	Agriculture Waste	Hazardous Waste	Commercial & other Sewage Waste
Planning of Reduce	10	05	13	15	16
Reuse	03	09	18	13	06
Recycle	10	07	02	02	02
Recover	07	11	09	07	12
Residual Management	07	09	10	04	12

Excel Solver New Technique Method:

Step -1Based on data in Table (1) transform the problem to a minimization problem. Those conditions we are applying are shown in the table below.

Table 2

Waste Disposal	Decision Variables					Row Sum
	Municipal Solid Waste	Industrial Waste	Agriculture Waste	Hazardous Waste	Commercial & other Sewage Waste	
Planning of Reduce						=Sum(Planning of Reduce Row)
Reuse						
Recycle						
Recover						
Residual Management						
Column Sum	=Sum(Municipal Solid Waste Col.)					

Spread Sheet Model For Waste Disposal & Type of Waste

						Row Sum		Supply
	1	0	0	0	0	1	=	1
	0	0	0	0	1	1	=	1
	0	0	1	0	0	1	=	1
	0	1	0	0	0	1	=	1
	0	0	0	1	0	1	=	1
Col Sum	1	1	1	1	1			
	=	=	=	=	=			
Demand	1	1	1	1	1			

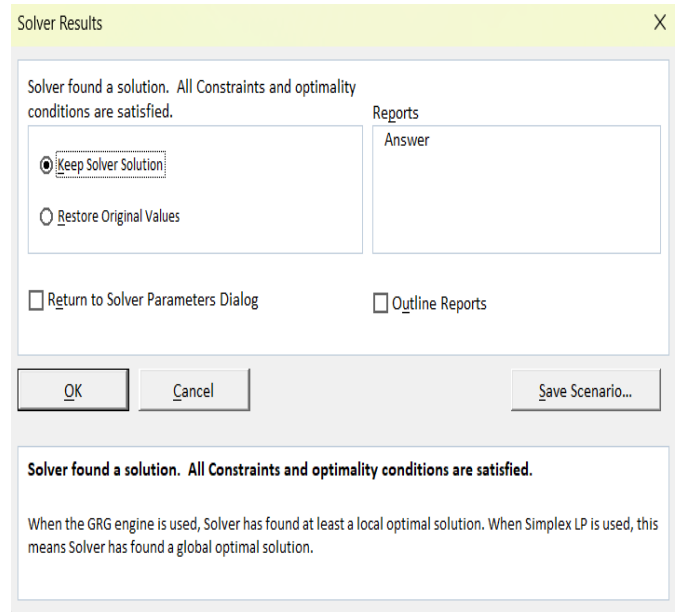
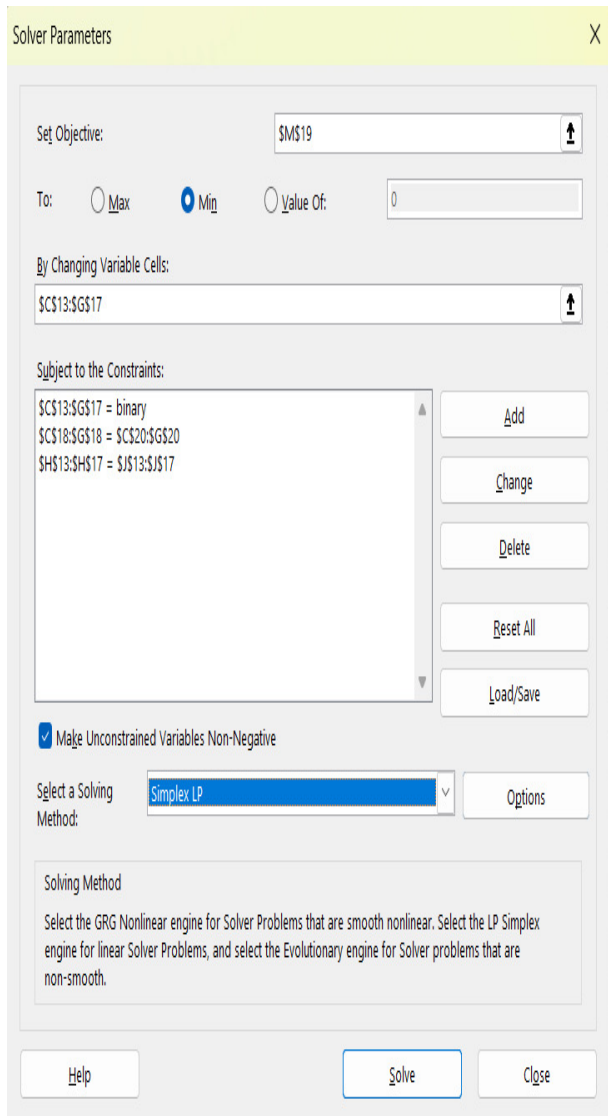
OBJECTIVE

Function(Zmin)=SUMPRODUCT(Table1,Table2)

Objective Function(Zmin)

Excel Solver Parameter:

Excel Software Use in Solver Tool Set objective



Expected Outcome:

Adopting Excel Solver technique, like in the case of a Nagar Nigam Offices managing waste across different cities, offers numerous benefits beyond efficient waste disposal and route optimization:

- ❖ Encourages thorough study and analysis.
- ❖ Enhances analytical skills and problem-solving abilities.
- ❖ Fosters critical thinking and innovation.
- ❖ Builds resilience to handle pressure and challenges.
- ❖ Facilitates resource allocation during crises.
- ❖ Streamlines inventory and distribution center management.
- ❖ Efficiently assigns resources and tasks.
- ❖ Optimizes delivery routes for maximum efficiency.
- ❖ Enables effective scheduling and task assignment, maximizing output with minimal input.
- ❖ Saves time and energy through efficient optimization.

Conclusion: So we can conclude that this method can be used on any Waste Management Problem, Recycling Inventory Product/Item, Disposable Item. Optimization Type/Excel Solver Type of Techniques is applied for Waste Product &

Recycling Product problems resolved in many fields can be modeled and solved using Excel Solver Method & Assignment Problems. This innovative Techniques will be very useful and easily resolved by Excel Solver & Operation Research This way is particularly helpful for students who are researchers and still want to take thesis courses. It does not require knowledge of complex mathematical concepts behind the solution algorithms.

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