Integration of Waste Disposal and E-Commerce

Effective waste management

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Abstract— **Waste comes as a part and parcel of any activity we do, whether we like it or not. Households, industries, factories, hotels all produce waste. Many of this waste ends up in landfills or even just disposed away carelessly. What many people don't realize is that what acts as waste for one party can serve as raw material for other. And waste management is at the forefront to make any city smart.**
Recognizing this issue, we aim to create a platform to integrate e-commerce and waste management by creating a website which would provide a platform for people to sell or buy waste.

Keywords— buyer, seller, proximity)

I. INTRODUCTION

a) Need

Waste management and its treatment is a problem faced by many countries. Through the years the amount of waste generated has drastically increased such that it has come to a point where managing waste has become extremely difficult. If this situation continues, then waste generated is expected to reach 160 thousand tons per year by 2041.

Fig1.Waste generation in thousand tonnes/Year

The main concern with the waste generated is how to dispose of them. Different methods like burning, recycling may be adopted but choosing the most effective one becomes the problem. The advantages and disadvantages of the methods should betaken into serious consideration before reaching into a conclusion.
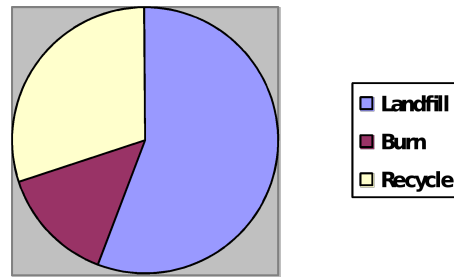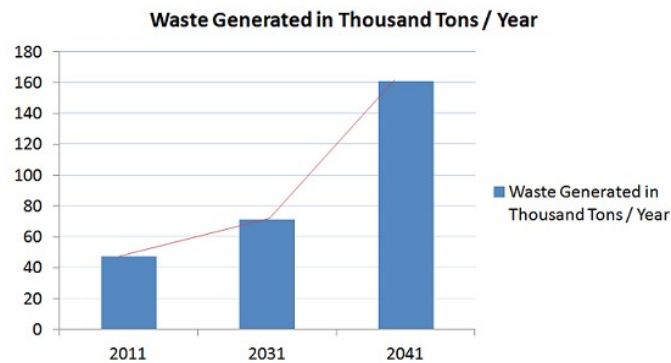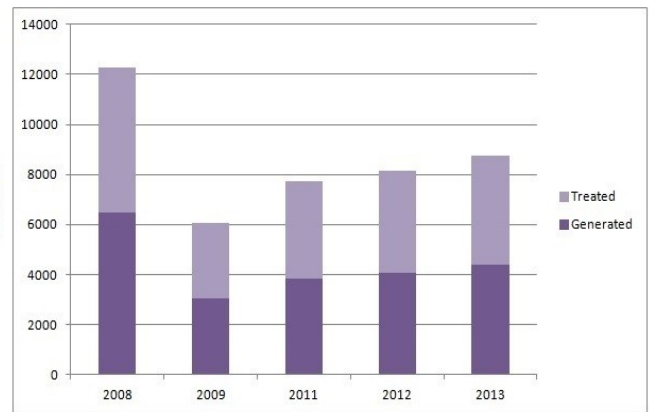

Fig2.Waste disposal mechanisms adopted

Among the ways listed the best solution definitely remains recycling of waste as we are putting an effort to turn waste into a resource. The current scenario is such that only a very small fraction of waste generated gets treated which leads to loss of resources.

Fig3.Amount of generated waste and treated waste

Out of waste generated in total around the globe only 31% goes for recycling, the remaining of the materials are disposed in undesirable means when they can be reused by another agency for a different purpose. Moreover, a lot of recyclable materials are also disposed off without treatment
The main problem related to this is in the acres of land that gets used for disposing all this waste. At the root level the amount of land required may not seem much, but it cumulates

to huge acres. With the increase in human population; we need to efficiently use our land and hence wastage of land is not something we can afford.

Therefore, we believe it is high time we started dealing with our waste more efficiently and smartly. Through our project we aim to achieve the same by integrating smart methods like e-commerce to enhance our waste management.
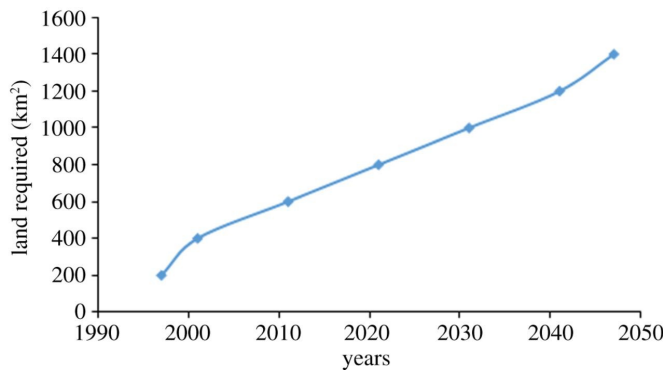

Fig4.Amount of land required for disposing waste
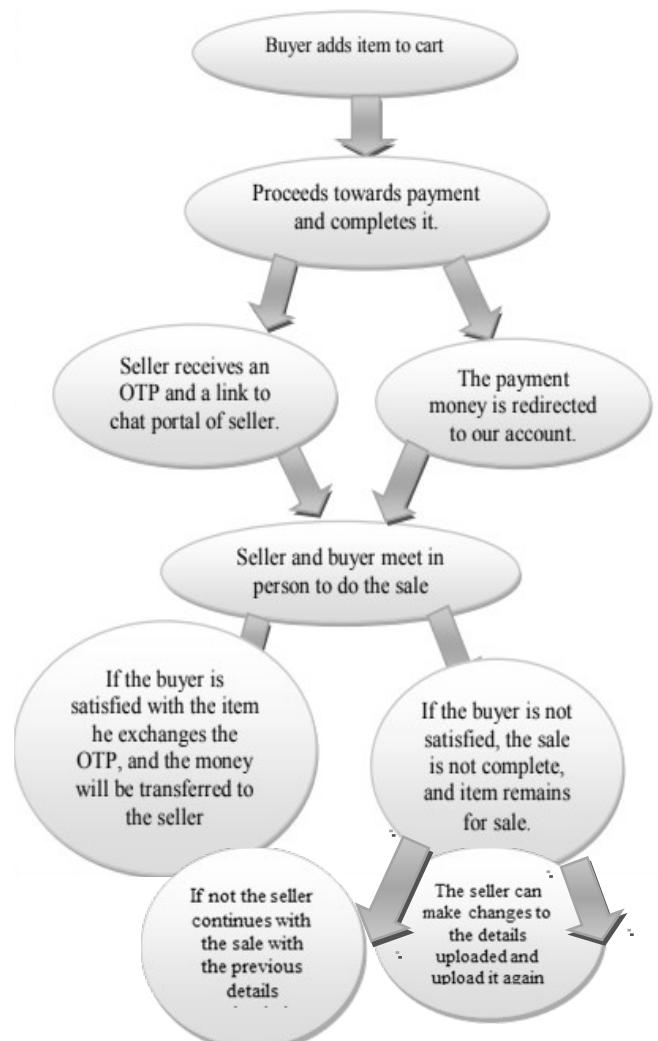
b) Project Idea

At the front tier we have two types of user mainly the seller and the buyer. The client should register with the website and then log in. Users who want to dispose off waste act as the seller and may upload details of the item which will then be put for sale. In most cases these waste materials tend to be useful for some other person. The buyers after selecting the item they want to buy, adds it to his cart and then proceed to buy what he needs. The payment for the same can be made online through different payment gateways integrated with our website.

On completing the payment, the buyer receives an OTP and a link to the chat portal of the seller. Payment amount remains with the website until the item is transferred to buyer. After the buyer is satisfied, he exchanges his received OTP with seller using which seller can close the deal. Only after this seller receives the payed amount.

Thus, a lot of fraud can be eliminated. This also provide an opportunity for seller to exchange the waste item in case he is not satisfied with the same as else the waste remains as a waste to the buyer.

In the case where the waste remains unsold it is dealt by different recycling agencies who are working with us at the next tier.

Waste disposal using E-COMMERCE is what we aim for. Through this the waste is turned into resource which ultimately helps a city economically. And that's why we believe this webpage can contribute towards a sustainable smart city**.**

II. PROJECT DESCRIPTION

A. Summary of working

The initial step for the user includes registering with the webpage. The webpage can be used by industries, households, companies as like. The user then logs into the page to access the facilities. If a user wishes to sell waste they will be redirected to the page where they should enter type of waste, upload details of the waste along with a picture, the location from where the waste can be received and the cost and then the waste is automatically categorized   into its different categories.

For e.g.: if the user wishes to sell aluminum waste they should enter details like how much tonne they have, the type of aluminum etc.
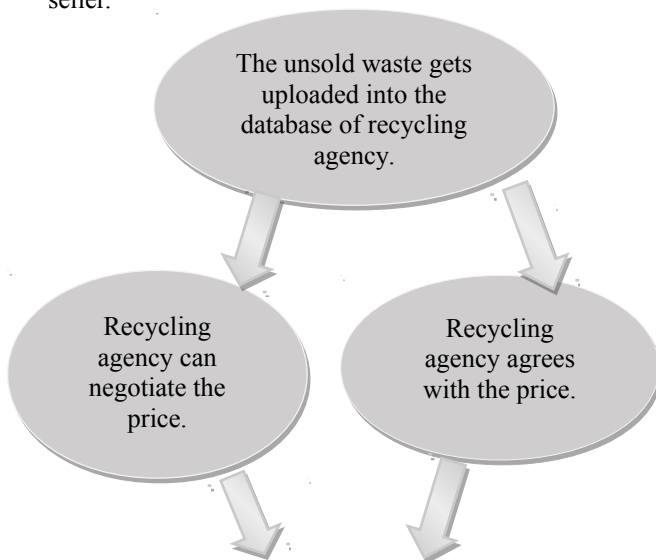
Once uploaded the seller will have the option to edit the details.
The cost will be increased by 5% from the uploaded price which will be the incentive we receive.

Else if the user wishes to buy the waste they should enter for the waste they want to buy. The buyer should apply the appropriate filters like quantity, cost, location so as to enable them to receive their required raw material at appropriate cost from their nearest proximity.

In case the uploaded waste goes unsold after a duration they will open for the recycling agents to buy. The duration will be different depending on the different categories of waste. For example, food waste is sent to the composting/recycling agencies after one day of its upload while other metal wastes are given a time limit of 14 days. Once the time duration is over, the item is redirected to the portal of the recycling agencies nearest recycling agency along with the expected cost that the seller has put up.
 The recycling agency can either buy the waste or negotiate the price with the seller. A minimum cost has been put up for each item by us to ensure that the seller gets the deserved amount. Once the seller and recycling agency close the deal, it is the duty of the agency to go and collect the item from the seller.

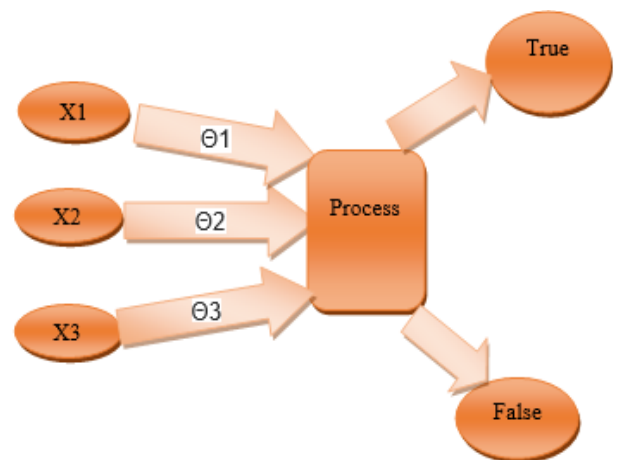*B) Machine learning applications*

-Image recognition
Disposed materials need to be identified and classified necessary for sorting. Deep convolutional neural network can achieve visual recognition tasks -- matching or sometimes even exceeding human performance in some aspects. The model needs to be trained to identify the category to which the waste belongs. To train the model on our own data, we will unfreeze at least one layer before the outputs (in order to adjust the model weights to our data) classes.

 -> USER INPUT (data on upload materials and image)

->Logical regression

Like linear regression, logical regression is another statistical, well-understood method for classification which finds the values for two coefficients that weight each input variable. The difference is that this solves problems of binary classification, relying on a logical, non-linear function instead. Therefore, logical regression determines whether a data instance belongs to one class or another and can also provide the reason behind the prediction, unlike linear regression.

Logical regression is used to classify the different types and store them in database.

Inputs-X1,X2,X3||
Weights- Θ1, Θ2, Θ3||
Outputs-True, False

B) Integration of Chat Portal

A JavaScript library called Socket.io is used which enables real time communication between clients and server. The JavaScript development stack called the MEAN (MongoDB, Express.js, AngularJS, Node.js) stack is also used.

At the server side Express.js framework is used for handling server-side rendering and logic while at the client-side, MVC pattern-based framework AngularJS is used.

C) Integration of Payment Portal

After considering various factors like location and incorporation., reach, efficiency, cost, safety etc. we

decided on integrating payment gateway through Sage Pay Direct Integration. It is a non-hosted payment gateway.

III. ADDITIONAL FEATURES

- Uploaded waste items are automatically categorized as edible food, food waste, furniture parts, metals, plastic etc and are presented to customer according to their search using filters.
- When a potential buyer searches for a particular waste material to use, all possible options are displayed in the order of proximity to make delivery easier.
- Unsold for a day, then by default the location of such biodegradable wastes are marked and transferred to proper disposal centres.
- If waste materials, scrap, plastic parts etc put for sale are unsold for a period of more than 15 days, then these are automatically transferred to recycling agencies partnering with us and a small share of profit still goes to the waste uploader.
- Payment can be made as credit cards, debit cards, pay tm etc
- Depending on the amount of waste sold or bought, the user will be awarded points. After a particular amount of points is secured, they can get a discount when they aim to purchase waste.
- The points can also result in a leader board which may include a sense of competition for selling more waste or buying which ultimately help the environment.
- . Payment amount remains with the website until the item is transferred to buyer. After the buyer is satisfied, he exchanges his received OTP with seller using which seller can close the deal. Only after this seller receives the payed amount. Thus, a lot of fraud can be eliminated.
- In order to incorporate daily wage workers, ragpickers are employed for in person item verification and API of online taxi services are incorporated for transportation of goods.
- The facility of sending link to the chat portal of the seller to the buyer ensures that the privacy of the seller and buyer is maintained as direction interaction will be maintained and information regarding location and so on will be shared at both of their will.

IV. MAJOR FUNCTIONALITIES

A. Steps

1. User registers with the webpage
2. Login with a unique user id and password.
3. Purpose-Buy or sell waste
4. Accounting
5. Integrate payment gateway
6. OTP generation, to be entered to mark close of sale
7. Logout
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B. Technology stack

The tools which we aim to use for this project are:

1.FRONTEND
- HTML
- CSS
- JAVASCRIPT
- BOOTSTRAP

2.BACKEND
- PHP
- MYSQL

3.DATABASE
- FIREBASE

4.MACHINE LEARNING
- TENSORFLOW

5.LOCATION
- GEOFIRE

6.PAYMENT GATEWAY
- An appropriate gateway for payment portal is included using its API considering factors like quality, security and processing features.

7.CHAT PORTAL
- MEAN Stack (Mongo, Express, Angular, Node).
- Sockets to enable one-on-one communication in real time
- AJAX for sign-up and login.

C. Tables

   a) *Demo Database:*Database contains a table to store login details of users, another table to store items on sale .

TABLE I.   LOGIN TABLE

SL NO	USER NAME	Mail id	User type	Points

TABLE 2   SELLER UPLOAD ITEM

User name	Item name	Item description	Item image	Cost	Location

TABLE 3   DATABASE OF ITEMS BOUGHT BY USER

SL NO	Seller id	Item bought	Cost	Status of sale

TABLE 4   DATABASE OF RECYCLING AGENCY

SL NO	Item Name	Expected cost	Status	Negotiated Cost

Acknowledgment

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