**EXCEL DASHBOARD LINK:** [Local Community Waste Management and Recycling Platform](https://docs.google.com/spreadsheets/d/17LphpsnGC7FHk0KlMeJYVYhVj7if295FRBi8SJS9_BM/edit?usp=sharing)

**PITCH DECK PRESENTATION LINK:** [**https://gamma.app/docs/Local-Community-Waste-Management-and-Recycling-Platform-delb1k0llax8c1n**](https://gamma.app/docs/Local-Community-Waste-Management-and-Recycling-Platform-delb1k0llax8c1n)

**Local Community Waste Management and Recycling Platform** (related to SDG 12: Responsible Consumption and Production)

### Part 1: SDG Selection and Problem Definition

#### SDG Selection:

* **SDG 12: Responsible Consumption and Production**.

### Problem Definition:

The current waste management system in Nairobi is plagued by several challenges that contribute to environmental degradation and public health risks:

* **Ineffective Waste Management and Recycling**: Insufficient community recycling initiatives and ineffective waste management practices have led to increasing waste accumulation, exacerbating pollution and environmental damage.
* **Illegal Dumping**: Illegal waste disposal is widespread, particularly in settlements and parts of Nairobi CBD, severely impacting both the environment and public health due to unregulated dumping practices.
* **Inadequate Municipal Cleaning**: Municipal waste management services are failing to maintain cleanliness in high-density areas such as Nairobi. The lack of regular cleaning and waste disposal contributes to unsanitary conditions and makes the city prone to further environmental degradation.
* **Poverty**: Economic constraints prevent many residents from affording regular garbage collection services, resulting in improper disposal practices, including open dumping and burning of waste, further exacerbating the waste management crisis.

### Goal:

The goal of this project is to develop a comprehensive, data-driven platform that addresses the critical waste management challenges in Nairobi. The platform will track waste generation, monitor illegal dumping, and assess municipal cleaning efforts. Additionally, it will promote community recycling initiatives and provide insights into areas where economic barriers hinder proper waste disposal, encouraging sustainable waste management and improved recycling habits across local communities.

### Part 2: Database Design

#### ERD (Entity-Relationship Diagram):

* **Entities**:
  1. **Community** (CommunityID, CommunityName, Population, Location)
  2. **IllegalDumpingSites** (DumpingID, Location, CommunityID, DateReported, WasteType, QuantityDumped)
  3. **WasteCollection** (CollectionID, CommunityID, WasteType, CollectionDate, QuantityCollected)
  4. **WasteCollectionPayments** (PaymentID, CommunityID, HouseholdID, PaymentDate, AmountPaid, Status)
  5. **MunicipalCleaning** (CleaningID, Area, Date, WasteType, CleaningStatus, Comments)
  6. **RecyclingCenter** (CenterID, CenterName, Location)
  7. **RecyclingRecord** (RecordID, CenterID, WasteType, QuantityRecycled, DateRecycled)
  8. **RecyclableMaterial** (MaterialID, MaterialName, Description)

#### Schema:

-- Community Table

CREATE TABLE Community (

CommunityID INT PRIMARY KEY,

CommunityName VARCHAR(100),

Population INT,

Location VARCHAR(100)

);

-- Illegal Dumping Sites Table

CREATE TABLE IllegalDumpingSites (

DumpingID INT PRIMARY KEY,

Location VARCHAR(100),

CommunityID INT,

DateReported DATE,

WasteType VARCHAR(50),

QuantityDumped FLOAT,

FOREIGN KEY (CommunityID) REFERENCES Community(CommunityID)

);

-- Waste Collection Payments Table

CREATE TABLE WasteCollectionPayments (

PaymentID INT PRIMARY KEY,

CommunityID INT,

HouseholdID INT,

PaymentDate DATE,

AmountPaid FLOAT,

Status VARCHAR(20),

FOREIGN KEY (CommunityID) REFERENCES Community(CommunityID)

);

-- Municipal Cleaning Table

CREATE TABLE MunicipalCleaning (

CleaningID INT PRIMARY KEY,

Location VARCHAR(100),

Date DATE,

WasteType VARCHAR(50),

CleaningStatus VARCHAR(50),

Comments TEXT

CommunityID INT, -- Foreign key linking to the Community table FOREIGN KEY (CommunityID) REFERENCES Community(CommunityID)

);

-- Waste Collection Table

CREATE TABLE WasteCollection (

CollectionID INT PRIMARY KEY,

CommunityID INT,

WasteType VARCHAR(50),

CollectionDate DATE,

QuantityCollected FLOAT,

FOREIGN KEY (CommunityID) REFERENCES Community(CommunityID)

);

-- Recycling Center Table

CREATE TABLE RecyclingCenter (

CenterID INT PRIMARY KEY,

CenterName VARCHAR(100),

Location VARCHAR(100)

);

-- Recycling Record Table

CREATE TABLE RecyclingRecord (

RecordID INT PRIMARY KEY,

CenterID INT,

WasteType VARCHAR(50),

QuantityRecycled FLOAT,

DateRecycled DATE,

FOREIGN KEY (CenterID) REFERENCES RecyclingCenter(CenterID)

);

-- Recyclable Material Table

CREATE TABLE RecyclableMaterial (

MaterialID INT PRIMARY KEY,

MaterialName VARCHAR(100),

Description TEXT

);

### Part 3: SQL Programming

#### Data Retrieval Queries

### **Retrieve all communities and their population**:

### SELECT CommunityName, Population, Location

### FROM Community;

### 

### **Retrieve all illegal dumping sites in a specific community**:

### SELECT Location, DateReported, WasteType, QuantityDumped

### FROM IllegalDumpingSites

### WHERE CommunityID = 1;

### 

### **Retrieve households with unpaid waste collection payments**:

### SELECT CommunityID, HouseholdID, PaymentDate, AmountPaid, Status

### FROM WasteCollectionPayments

### WHERE Status = 'Unpaid';

### 

### **Retrieve all recycling records for a specific recycling centre**:

### SELECT WasteType, QuantityRecycled, DateRecycled

### FROM RecyclingRecord

### WHERE CenterID = 1;

### 

### **Retrieve all waste collected by type in each community**:

### SELECT CommunityID, WasteType, SUM(QuantityCollected) AS TotalCollected

### FROM WasteCollection

### 

### GROUP BY CommunityID, WasteType;

#### Data Analysis Queries

### **Calculate total waste dumped illegally by community**:

### SELECT CommunityID, SUM(QuantityDumped) AS TotalIllegalDumped

### FROM IllegalDumpingSites

### GROUP BY CommunityID;

### 

### **Find the recycling rate by waste type**:

### SELECT WC.WasteType,

### SUM(WC.QuantityCollected) AS TotalCollected,

### SUM(RR.QuantityRecycled) AS TotalRecycled,

### (SUM(RR.QuantityRecycled) / SUM(WC.QuantityCollected)) \* 100 AS RecyclingRate

### FROM WasteCollection WC

### LEFT JOIN RecyclingRecord RR ON WC.WasteType = RR.WasteType

### GROUP BY WC.WasteType;

### 

### **Identify areas with the most frequent illegal dumping incidents**:

### SELECT Location, COUNT(\*) AS NumberOfIncidents, SUM(QuantityDumped) AS TotalQuantityDumped

### FROM IllegalDumpingSites

### GROUP BY Location

### ORDER BY NumberOfIncidents DESC;

### 

### **Analyze unpaid waste collection rates by community**:

### SELECT CommunityID,

### COUNT(CASE WHEN Status = 'Unpaid' THEN 1 END) AS UnpaidCount,

### COUNT(\*) AS TotalHouseholds,

### (COUNT(CASE WHEN Status = 'Unpaid' THEN 1 END) \* 100.0 / COUNT(\*)) AS UnpaidRate

### FROM WasteCollectionPayments

### GROUP BY CommunityID;

### 

### **Track municipal cleaning efforts and completion status**:

### SELECT Location, Date, WasteType, CleaningStatus

### FROM MunicipalCleaning

### WHERE CleaningStatus IN ('Pending', 'Incomplete');

### Part 5: Integration /Exporting Data from the Database

* Run the SQL queries (e.g., data retrieval or analysis queries) to generate the relevant datasets.
* Export the results as a CSV file, Export Results > CSV.
* Open Excel. Go to the Data tab. Click on From Text/CSV. Browse to your exported CSV file and click Import.
* After importing, ensure that: Data types are correctly formatted in Excel (e.g., dates should appear as dates, numbers should appear as numbers). Column headers in Excel match those in the database. No data is missing or corrupted during the export/import process.