**Task 1.1 – Selection of the case upon which the database design and implementation is to be based.**

AD-Recycle company is a company which operates in the recycling industry. The company is aware of the expanding issue of plastic waste and its detrimental effects on the Ghanaian populace. As a result, the company has aimed to develop a long-term approach to handling plastic waste. The organization's activities include installing recycling equipment and sorting systems in various places, including public spaces, markets, and residential areas. These devices and systems gather plastic waste from the general public, categorize it, and then deliver it to the nearby recycling facility for processing. The recycling facilities are outfitted with cutting-edge machinery that can convert plastic materials into reusable forms. The company also provides consultancy services to businesses and governments on environmentally friendly trash management. These services include waste audits, waste management plan creation, and recycling program execution. The group wants to encourage environmentally friendly habits and decrease plastic waste by offering these services.

Businesses, governments, and people interested in improving environmental sustainability by lessening the damaging effects of plastic trash on the environment make up the organization's target market. This comprises people who care about the environment, nonprofit groups, local governments, and companies striving to adopt sustainable practices. The organization's overall objective is to improve environmental health and cleanliness by minimizing the quantity of plastic garbage that enters landfills or contaminates our natural resources. The organization's database management system will aid in streamlining its operations and offer insightful information on the collection, transportation.

**Operations/ Functionalities.**

* Keep track of the type and volume of plastic waste collected, its source and the date it was collected.
* Keep track of the routes that the collected plastic waste is transported on as it is delivered to the recycling facilities.
* Keep track of recycling facilities where the plastic is processed as well as the quantity of plastic waste sent to each facility.
* Manage recycling equipment and sorting systems maintenance and service.
* Mange information on the customers who provide plastic waste for recycling. This includes contact details, preferences for collection and payment.
* Store data on the various forms of recycled plastic produced, including data on their composition, quality, and potential applications.

**Task 1.2 - Provide a conceptual database design for your scenario and list of the enterprise rules being modelled.**

**Entity Relationships:**

* There is a one-to-many relationship between plastic waste and waste collection. Waste collection can have many types of plastic waste being collected but many plastic wastes belong to only one waste collection.
* A one-to-many relationship exists between customer and waste collection. One customer can have many waste collections, but one waste collection belongs to one customer.
* A one-to-many relationship between driver and waste collection. Each waste collection is assigned to one driver, but a driver can have multiple waste collections.
* A one-to-many relationship between driver and transportation route. A driver can use multiple and different transportation routes, but each transportation route is use by just one driver at a time.
* A one-to-many relationship between recycling facility and recycled plastic. A recycling facility can process and produce multiple forms of recycled plastic, but the recycled plastic is produced by just one recycling facility.
* A one-to-many relationship between driver and recycling facility. A recycling facility can receive plastic waste from multiple drivers, but each driver delivers to only one recycling facility at a time.
* A one-to-many relationship between customer and recycled plastic. A customer can receive multiple forms of recycled plastic, but each form of recycled plastic is made and delivered to one customer.
* A one-to-many relationship between customer and plastic waste. One customer can provide lots of plastic waste, but each type or volume of plastic waste belongs to only one customer.
* A one-to-many relationship between transportation route and waste collection. One transportation route can be used or multiple waste collections, however each was collection belongs to one transportation route.
* A one-to-many relationship between transportation route and recycling facility. A recycling facility can have many transportations route, nut each transportation route is assigned to one recycling facility.
* A one-to-many relationship between transportation route and recycled plastic. Recycled plastic can be delivered via many transportation routes, but each transportation route is used to deliver one consignment of recycled plastic.
* A many to one relationship with both the customer and recycled plastic tables, each sage entry corresponds to a single customer and a single type of recycled plastic.
* A many to one relationship with the recycling facility and maintenance schedule. Each maintenance schedule entry corresponds to a single recycling facility.
* A many to one relationship with the recycling facility table, as multiple sorting facilities can be a part of a single facility.
* A many to one relationship with both the customer and plastic waste tables, as each schedule entry corresponds to a single customer and a single type of plastic waste.
* The Sorting Request table has a many-to-one relationship with both the Customer and Plastic Waste tables, as each request corresponds to a single customer and a single type of plastic waste.
* The Sorting Result table has a many-to-one relationship with both the Sorting Request and Sorting Facility tables, as each result corresponds to a single request and a single sorting facility
* The Recycling Process table has a many-to-one relationship with both the Recycling Facility and Recycled Plastic tables, as each process corresponds to a single facility and input/output plastic types.

**ERR Diagram**

**Chart

Description automatically generated**

**Logical table derivation:**

* **Plastic Waste**: **wasteID (PK)**, Type of plastic, Volume, Source, collection date
* **Driver:** **driverID (PK),** name, address, phone number, license number, truck type
* **Waste collection:** **collectionID (PK),** *driverID, wasteID,* collection date, collection time, collection location
* **Transportation route:** *driverID, facilityID, plasticID,* start location, end location, distance, time taken.
* **Facility: facilityID (PK),** name, address, contact
* **Recycling facility:** *facilityID*, recycling limit, facility location
* **Sorting facility:**  *facilityID*, sorting mechanisms, sorting rate
* **Customer:** **customerID (PK)**, name, address, phone number, collection preferences, payment preferences.
* **Recycled plastic:** **plasticID (PK)**, *facilityID, customerID,* type of plastic, composition, quality, potential applications.
* **Collection schedule: scheduleID (PK),** *customerID, wasteID,* collection day of week, collection Time of day.
* **Sorting request: requestID (PK),** *customerID, wasteID,* request date, request status.
* **Sorting result: resultID (PK),** *requestID, facilityID,* sorted waste type, sorted waste volume.
* **Recycling Process: processID (PK),** *facilityID, wasteID, plasticID,* process date, process status.
* **Plastic usage:** *customerID, plasticID,* usage date, usage volume.
* **Maintenance schedule:** *facilityID,* maintenance date, maintenance description.

**Assumptions**

* Plastic waste is sorted properly before it is collected.
* Waste collections are schedule in advance and drivers are assigned to each waste collection.
* Customers have specific preferences for the types and volumes of recycled plastic they receive.
* Recycling facilities are well equipped to process and produce various forms of recycled plastic.

**Enterprise rules**

* Each waste collection must be assigned to one driver.
* Each waste collection must have at least one type of plastic waste.
* Each transportation route must have a start and end location.
* Each recycled plastic consignment must be produced by one recycling facility.
* Each recycled plastic consignment must be made and delivered to one customer.
* Each type and volume of plastic waste must belong to one customer.

**YouTube video URL:** [**https://youtu.be/jIoK7jdm-5U**](https://youtu.be/jIoK7jdm-5U)