### **Phase 2: Business Process Modeling for Coffee Cooperative Management System**

#### **1.Project Scope**

This project aims to develop a **centralized, structured database system** designed to address the specific operational needs of Rwandan coffee cooperatives. The scope includes creating a comprehensive system to record, organize, and manage critical data on farmers, cooperatives, cooperative managers, farm plots, sales transactions, and buyers. By integrating these data elements, the system will streamline daily operations, enhance data accuracy, and support decision-making processes within the cooperative framework.

The system will track key activities, such as coffee production and sales transactions, while maintaining organized records for each farmer, cooperative, and buyer. Additionally, the database will consolidate financial information related to sales, which will improve cash flow monitoring and financial transparency. The database will also facilitate efficient allocation of resources, real-time reporting, and improved coordination among farmers, cooperative managers, and market buyers.

#### **Objective of the Database**

The primary objective of this database system is to provide Rwandan coffee cooperatives with a **centralized and structured platform** for managing their entire operations efficiently. Key objectives include:

1. **Efficient Tracking of Farmers and Farm Activities**: The system will store comprehensive information on each farmer and farm plot, supporting clear tracking of production activities and enabling tailored support for farmers based on their profiles and geographic locations.
2. **Enhanced Financial Transparency**: By recording all coffee sales transactions, including quantities sold and corresponding revenue, the system will improve financial oversight. This will ensure that cooperative members and stakeholders have clear visibility into cash flow and financial health.
3. **Streamlined Buyer and Market Interaction**: The database will maintain records of buyer relationships, allowing cooperatives to track market demand, buyer preferences, and sales history. This will help ensure cooperative alignment with market needs and foster long-term partnerships with buyers.
4. **Real-Time Reporting and Data-Driven Decision-Making**: The database will generate real-time reports to empower cooperative leaders to make informed, data-driven decisions that enhance productivity, improve coffee quality, and boost profitability.

#### **2. Identify Key Entities**

### **1. Farmers**

* **Role**: Farmers are the primary producers in the cooperative, responsible for cultivating and harvesting coffee.
* **Data Tracked**: Information such as Farmer\_ID, Farmer\_Name, District, Sector, Plot\_Name, and Cooperative\_Name.
* **Interaction**: Farmers provide essential data about their production, which feeds into cooperative records. This data helps track the source of coffee sold, supporting transparency in the cooperative’s supply chain.

### **2. Cooperatives**

* **Role**: The cooperative entity represents the organizational structure, managing groups of farmers within a region.
* **Data Tracked**: Cooperative\_ID, Cooperative\_Name, District, Sector, Number\_of\_Members, and Manager\_ID.
* **Interaction**: Cooperatives coordinate between farmers, cooperative managers, and market buyers. They ensure that resources are properly allocated to support farmers and manage operations effectively across multiple farms.

### **3. Cooperative Managers**

* **Role**: Cooperative managers oversee day-to-day activities within the cooperative, acting as the point of contact between farmers and the cooperative leadership.
* **Data Tracked**: Manager\_ID, Manager\_Name, Cooperative\_Name, Plot\_Name, and Plot\_ID.
* **Interaction**: Cooperative managers manage farm operations, monitor farmer productivity, and ensure that farm activities align with cooperative goals. They facilitate communication between farmers and the cooperative, ensuring data on production, resource needs, and sales are accurately maintained.

### **4. Farm Records**

* **Role**: The farm records entity documents specific details about each farm plot, supporting operational oversight.
* **Data Tracked**: Plot\_ID, Plot\_Name, District, and Sector.
* **Interaction**: These records allow cooperative managers to monitor each plot’s location, productivity, and crop management. Data from farm records informs decisions on resource allocation, quality control, and farmer support strategies.

### **5. Sales Records**

* **Role**: Sales records track all coffee transactions, documenting sales made by farmers and cooperatives to buyers.
* **Data Tracked**: Transaction\_ID, Farmer\_ID, Farmer\_Name, Plot\_ID, Plot\_Name, Cooperative\_ID, Cooperative\_Name, Kilograms\_Sold, and Sales\_FRW.
* **Interaction**: Sales records help maintain financial transparency by logging all coffee sales, revenue generated, and corresponding farmer contributions. This data enables cooperative leaders to analyze revenue trends and make informed financial decisions.

### **6. Buyers Records**

* **Role**: Buyers records contain information about clients and market partners purchasing coffee from the cooperative.
* **Data Tracked**: Buyer\_ID, Business\_Name, Owner\_Name, Date\_Purchased, Quantity\_Purchased\_KG, and Amount\_Spent\_FRW.
* **Interaction**: Buyer data allows cooperatives to manage relationships with clients, track market demand, and ensure alignment with buyer preferences. This supports long-term partnerships and helps cooperatives plan for future production based on buyer needs.

**EXPLANATION OF THE BPMN DIAGRAM OF OUR PROJECT**

The business model is structured to manage and integrate critical information within a coffee cooperative. Key entities include **Farmers**, who provide production data; **Cooperatives**, which organize and manage groups of farmers; and **Cooperative Managers**, who oversee daily activities and resource distribution within each cooperative. **Farm Records** store details about specific farm plots, while **Sales Records** document all coffee sales transactions, linking each sale to the relevant farmer, plot, and cooperative. Finally, **Buyers Records** track information about market clients purchasing coffee, helping to maintain buyer relationships and support sales strategies.

This model incorporates primary and foreign keys to enforce data integrity and ensure accurate relationships across entities, allowing the cooperative to track production, sales, and buyer interactions effectively. Through this centralized data structure, cooperatives can make data-driven decisions, maintain financial transparency, and efficiently allocate resources to improve overall operations.