# UMUHUZA PLATFORM

Empowering Rwandan Agriculture through Digital Integration and Data Intelligence

## 1. Title

UMUHUZA Platform: A Data-Driven Agricultural Information and Collaboration System

## 2. Introduction

Agriculture is the backbone of Rwanda’s economy, employing over 70% of the population. However, many farmers still face challenges in accessing timely information about weather, market prices, quality inputs, and reliable buyers. This lack of access leads to inefficient production, poor decision-making, and limited profitability across the agricultural value chain.  
  
To address these challenges, the UMUHUZA Platform (meaning 'Connector' in Kinyarwanda) was designed as a digital bridge between key agricultural stakeholders — farmers, agro-dealers, processors, and researchers. The platform leverages data science, analytics, and digital communication to provide real-time information, foster collaboration, and improve productivity and market access in Rwanda’s agriculture sector.

## 3. Data Methodology

The platform integrates multiple data sources to provide accurate insights:

- Weather Data (Open-Meteo API)  
- Market Prices (Local Market Inputs & CSV Datasets)  
- Research Data (NISR Datasets)  
- Inventory & Orders (Internal Database)

Data is collected, cleaned, and visualized. Weather data comes from APIs, market data is updated manually or uploaded in CSV, and internal transactions are stored dynamically in the database.

## 4. Data Science Solution Developed

The UMUHUZA Platform provides data-driven dashboards and features for each user role:

- Farmer Dashboard: weather, market prices, farming tips, and order management.  
- Agro-Dealer Dashboard: inventory management, orders, and policy updates.  
- Processor Dashboard: crop listings, logistics, and quality certifications.  
- Researcher Dashboard: visual data insights, chart analytics, and dataset downloads.

## 5. System Architecture

1. Frontend: HTML, CSS, JavaScript  
2. Backend: Flask (Python)  
3. Database: SQLite/MySQL  
4. APIs: Open-Meteo, NISR CSVs  
5. Visualization: Chart.js

## 6. Roles and Functionalities

Farmer - Access market info, weather, tips, and order inputs.  
Agro-Dealer - Manage inventory, orders, and communicate with farmers.  
Processor & Customer - Access available crops, manage logistics.  
Researcher - Analyze datasets and download CSVs.

## 7. Limitations

- Limited internet access for farmers.  
- Manual data entry for some modules.  
- Lacks predictive models.  
- Depends on API data accuracy.  
- Limited mobile access.

## 8. Recommendations

1. Develop mobile apps with offline access.  
2. Integrate SMS alerts.  
3. Implement predictive analytics.  
4. Automate market data collection.  
5. Add multilingual support.  
6. Strengthen data security.  
7. Collaborate with NISR and RAB for data accuracy.

## 9. Impact and Benefits

- Farmers make informed decisions.  
- Agro-dealers optimize inventory.  
- Processors ensure product quality.  
- Researchers and policymakers get reliable data.

## 10. Conclusion

The UMUHUZA Platform digitally transforms Rwanda’s agriculture by connecting all stakeholders through data-driven systems. It promotes transparency, productivity, and collaboration for a sustainable agricultural future.

## 11. Project Information

Developer: Olivier Niyonkuru and Ashula Ishimwe   
Language: Python (Flask), HTML, CSS, JavaScript

Database: MySQL