

**UNDERGRADUATE RESEARCH PROPOSAL**  
**DEVELOPMENT OF A SMALL-SCALE CROP FARMERS'**  
**DIGITAL MARKETPLACE FOR RUNDU, NAMIBIA**

A RESEARCH PROPOSAL SUBMITTED TO THE  
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## Contents

1.1 Background .....	3
1.1 Motivation .....	3
1.3 Problem Statement.....	4
1.4 Objectives.....	4
1.5 Justification .....	5
1.6 Delimitation (Scope & Boundaries) .....	5
1.7 Project Constraints .....	5
1.8 Work Plan (Timeline) .....	6
CHAPTER 2: REVIEW OF RELATED LITERATURE .....	6
2.2.1 Introduction .....	6
2.2.2 Traditional Small-Scale Practices .....	6
2.2.3 Digital Marketplaces and E-Commerce in Agriculture .....	7
2.2.4 Challenges and Trust in Online Marketplaces .....	8
2.2.5 Chapter Summary.....	8
CHAPTER 3: ANALYSIS AND DESIGN.....	9
3.3.1 Introduction .....	9
3.3.2 Gathering of Requirement.....	9
3.3.3 Development Methodology .....	9
3.3.4 Requirements Specification .....	9
3.3.5 System Design.....	9
3.3.6 User Interface Design .....	10
3.3.7 Database Design.....	10
3.3.8 Hardware and Software Requirements .....	10
3.3.9 Chapter Summary.....	10
REFERENCES .....	11

## CHAPTER 1: INTRODUCTION

### 1.1 Background

Small-scale crop farmers operating in Rundu face significant challenges accessing reliable markets for their produce. These farmers, often based on the outskirts of the city or in surrounding informal settlements, rely heavily on open-air markets, roadside stalls, and word-of-mouth to sell their goods. Without consistent customer bases or digital visibility, they are vulnerable to fluctuating demand, crop spoilage, and exploitation by informal middlemen who offer low prices. In many cases, excess produce goes unsold not due to a lack of demand, but because of poor communication between producers and potential buyers such as households, restaurants, or small retailers within Windhoek.

Namibia's **Vision 2030** highlights the importance of promoting food security, poverty reduction, and the integration of information and communication technologies (ICTs) to modernize the agricultural sector (Republic of Namibia, 2004). However, despite national efforts, many smallholder farmers remain digitally excluded and lack tools to scale their operations. According to the Namibian Agronomic Board (2023), limited market access and poor infrastructure remain two of the most pressing issues affecting smallholder farmer income and growth.

### 1.1 Motivation

The motivation for this project stems from direct observations of small-scale crop farmers in Groot Aub who struggle to access buyers consistently, often leading to unsold harvests and financial instability. The informal nature of their sales model means that much of their effort goes unrewarded, and any economic growth is difficult to sustain. Additionally, consumers within Windhoek frequently pay high prices for produce that could be sourced more affordably and freshly from nearby rural areas such as Rundu.

The study is supported by The Namibian Agronomic Board (2023) noted that limited market visibility is one of the key constraints for smallholder crop farmers, especially those not connected to formal distribution networks. Furthermore, a report by GSMA (2021) emphasized that digitally connecting rural and peri-urban farmers to markets has the potential to significantly increase their incomes, reduce post-harvest loss, and promote local food systems.

### **1.3 Problem Statement**

Small-scale crop farmers in Rundu face a persistent challenge which is limited access to consistent and profitable markets for their produce. Without a centralized platform to promote their crops, many rely on informal selling methods such as roadside stands, word-of-mouth advertising, or small weekend markets, which are often unreliable and offer little financial security. Therefore, the core problem is the lack of a digital infrastructure to connect Rundu-based small-scale crop farmers directly with nearby buyers in a secure, efficient, and scalable way. This digital gap results in missed income opportunities, produce wastage, and continued marginalization of smallholder farmers from the growing urban economy. Thus, the proposal aims to develop a digital marketplace tailored to their specific needs.

### **1.4 Objectives**

- To develop a digital platform that will connect small-scale crop farmers directly to consumers.
- To identify challenges that limit trust and transparency between users.
- To provide consistent availability and accessibility.

## **1.5 Justification**

This project would assist farmers to provide a direct, digital channel to showcase and sell their produce to nearby buyers, reducing post-harvest waste and dependency on middlemen, Okoro (2020). This project directly supports Namibia's Vision 2030, which emphasizes ICT integration as a driver for economic inclusion and agricultural development, Republic of Namibia (2004). By providing a user-friendly and locally relevant digital platform, the system empowers farmers with better pricing control, wider reach, and more reliable demand ultimately contributing to food security and rural-urban economic balance Kumar (2022).

## **1.6 Delimitation (Scope & Boundaries)**

The intended users are small-scale crop farmers and local buyers (shoppers, shops, restaurants) in the target area. The project will focus on a web application accessible through standard browsers (desktop and mobile). Core features will include user accounts, product listings with details and images, search and filter tools, a shopping cart, and payment processing. The system will not include the development of a mobile app, physical delivery logistics, or complex supply-chain management. Advanced features such as machine-learning price predictions or credit scoring are out of scope as well. The emphasis is on connecting farmers and buyers, not on handling transportation or warehousing of goods.

## **1.7 Project Constraints**

- Limited financial and technical resources
- Connectivity issues in rural areas
- Low digital literacy among some farmers
- Time limitations for extensive field testing

## 1.8 Work Plan (Timeline)

Task	Duration	Start Date	End Date
Requirements Analysis & Survey	2 weeks	10/07/2025	20/07/2025
System Design & Prototyping	3 weeks	21/07/2025	04/08/2025
Development (Backend & Frontend)	5 weeks	05/08/2025	08/09/2025
Testing & Iteration	3 weeks	09/09/2025	29/09/2025
Deployment & Evaluation	3 weeks	30/09/2025	20/10/2025

## CHAPTER 2: REVIEW OF RELATED LITERATURE

### 2.2.1 Introduction

Literature on digital transformation in agriculture highlights the importance of mobile technology, digital platforms, and e-commerce in empowering rural farmers. This Chapter explores traditional practices, existing platforms, and the role of trust in online trade.

### 2.2.2 Traditional Small-Scale Practices

Namibian small-crop farmers mainly sell via local open markets or informal vendors.

These methods are seasonal, localized, and rarely offer price transparency or secure income.

Moreover, many farmers depend on intermediaries who act as middlemen. These traders often have advanced information on demand and set prices accordingly. Studies in Sub-Saharan Africa note that local traders frequently exploit information asymmetry. Farmers may accept low prices, especially when faced with fresh harvests and no storage, Sithole (2024)

Furthermore Sithole (2024), stated that Small-scale crop farmers, in particular, face barriers to accessing markets at the right time, which lowers their profitability. Without a centralized platform, farmer listings or announcements (for extra harvest) have limited reach. In-person bulletin boards or social media groups are sometimes used informally, but these lack structure and reliability. As a result, many farmers miss out on potential sales or must accept volatile, depressed prices at harvest time.

### **2.2.3 Digital Marketplaces and E-Commerce in Agriculture**

In Africa, platforms like Twiga Foods (Kenya) and AgroMall (Nigeria) have shown success in connecting farmers to retailers. Such systems offer inventory tracking, online payments, and transportation coordination elements such as these that could be adapted locally, International Trade Centre [ITC], (2021).

Another instance is Kenya's M-Farm platform, farmers receive market price information via SMS and can post offers; similarly, Nigeria's Farmcrowdy aggregates farm produce for direct sale. These examples show that mobile and web technologies can thrive even in rural settings, provided there is sufficient connectivity.

Morepje (2024) concluded that linking farmers to broader markets through digital means can improve farmer welfare and stability.

#### **2.2.4 Challenges and Trust in Online Marketplaces**

While e-commerce holds promise, successful platforms must address trust, usability, and infrastructure challenges. Farmers and buyers are often untrusting or unfamiliar with online systems, therefore, features like user ratings, verified profiles, and secure payment are important. Digital illiteracy is a major barrier to adoption. Farmers are also concerned about fake buyers, delays in payments, and lack of personalized support. A trustworthy interface, education, and browser-friendly design are essential, (USAID, 2020). Farmers may lack experience with online payments or may have intermittent internet.

#### **2.2.5 Chapter Summary**

While the potential for digital marketplaces in agriculture is promising, local adaptation, affordability and education are the main focal points. Building trust through community-Based rollout can help small-crop farmers adopt and benefit from such platforms.



## **CHAPTER 3: ANALYSIS AND DESIGN**

### **3.3.1 Introduction**

This chapter focuses on the technical design and analysis phase of the project. It covers the approach used to gather requirements and design a working prototype.

### **3.3.2 Gathering of Requirement**

Requirements will be collected through:

Interviewing small-crop farmers in Rundu, questionnaires daily to consumers and small-scale crop farmers, and reviewing similar platforms (FarmCrowdy and AgriMarket)

### **3.3.3 Development Methodology**

An Agile (Scrum framework) methodology will be used. This iterative approach is suited to evolving requirements. The researcher will work in short sprints, hold regular stand-up meetings, and deliver functional increments of the system for feedback. This method supports feedback loops with potential users during design stages.

### **3.3.4 Requirements Specification**

Key requirements include user registration, item posting, search functionality, and secure messaging. The system will use a responsive UI, RESTful API, PostgreSQL database, and AWS S3 for image storage.

### **3.3.5 System Design**

The system will follow a three-tier architecture which includes the Presentation Layer (Mobile web interface) Application Layer (Logic handling (Node.js)) and the Data Layer (MySQL database).

### **3.3.6 User Interface Design**

The system will include a home page with a search function that has optional featured/recent listings and filters. Registration and login page with a simple form with role selection (farmer/buyer). The product catalog displays items in a grid/list with thumbnails, titles, prices, seller info, and distance. The product detail page show will show larger images, full details, and seller information. Farmers manage orders via a dashboard, viewing buyer details and updating order status (completed/cancelled). Buyers track past orders with status (Pending/Completed) in their order history.

### **3.3.7 Database Design**

The database design for the Crop Farmers Marketplace platform is centered around a relational model, key tables include Users for storing information about both farmers and buyers, Products for detailed crop listings with images, Orders to manage buyer transactions, and Payments to track completed financial exchanges. It will include a Messages table that will store internal communication between users. The schema includes essential fields such as user roles, product categories, listing timestamps, and order statuses. Overall, the database will support the platform's need for real-time data access, secure transactions, and scalable growth as more users and listings are added.

### **3.3.8 Hardware and Software Requirements**

Development will require sufficient processing power (e.g. Intel i5/Ryzen 5 or higher), at least 8GB RAM, and ample storage (255 GB SSD minimum) for running development tools and local servers. The software stack includes Windows, Visual Studio Code, and open-source frameworks.

### **3.3.9 Chapter Summary**

This chapter detailed the methodology, requirements, and design for the platform. The next steps involve development, testing, and deployment.

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