

KISAN BUDDY

A PROJECT REPORT

Submitted by,

K Faseeha Naaz - 20211CBD0012

Shreya Paul - 20211CBD0002

Inzemam Raza - 20211CBD0026

Under the guidance of,

Dr. Srinivasan T R
Professor

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PRESIDENCY UNIVERSITY
SCHOOL OF COMPUTER SCIENCE ENGINEERING
CERTIFICATE

This is to certify that the Project report “**KISAN BUDDY**” being submitted by “K Faseeha Naaz, Shreya Paul, Inzemam Raza” bearing roll number(s) “20211CBD0012, 20211CBD0002, 20211CBD0026” in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering is a Bonafide work carried out under my supervision.

Dr. Srinivasan T R
Professor
School of CSE
Presidency University

Dr. Pravinthraja
Head of Department
School of CSE
Presidency University

Dr. L. SHAKKEERA
Associate Dean
School of CSE
Presidency University

Dr. MYDHILI NAIR
Associate Dean
School of CSE
Presidency University

Dr. SAMEERUDDIN KHAN
Pro-Vc School of Engineering
Dean -School of CSE&IS
Presidency University

PRESIDENCY UNIVERSITY
SCHOOL OF COMPUTER SCIENCE ENGINEERING

DECLARATION

We hereby declare that the work, which is being presented in the project report entitled **KISAN BUDDY** in partial fulfillment for the award of Degree of **Bachelor of Technology in Computer Science and Engineering (Big Data)**, is a record of our own investigations carried under the guidance of **Dr. Srinivasan T R, Professor, School of Computer Science and Engineering, Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

K Faseeha Naaz – 20211CBD0012

Shreya Paul – 20211CBD0002

Inzemam Raza – 20211CBD0026

ABSTRACT

Farmers have numerous challenges in achieving equal market access, fair pricing, and optimal profitability in a competitive agricultural sector. This paper offers a new digital platform employing sophisticated capabilities to address these challenges effectively. The platform's major feature is a bidding process that allows farmers to market their products and get offers from several buyers, resulting in more competitive pricing. A top bidder listing function gives real-time transparency, enabling farmers to make more informed decisions based on the highest bids. In addition to pricing optimization, the platform includes a location-based advising tool that helps farmers select the most profitable marketplaces by studying demand patterns, pricing trends, and logistical feasibility. A location access tool is included to improve operational efficiency, providing a graphical representation of producer, consumer, and mandi sites. This feature allows for smoother navigation, delivery route optimization, and improved logistics management, all of which lead to better decision-making and profitability. This complete approach ensures that farmers are able to successfully bridge the production-market gap. The proposed system is designed to be user-friendly and scalable, with applications spanning from small to large-scale agricultural. The platform aims to create a more egalitarian and efficient agricultural economy by boosting transparency, reducing logistical inefficiencies, and ensuring fair pricing. Preliminary assessments demonstrate that the platform improves farmers' profitability, decision-making skills, and market access. Future work will focus on integrating predictive analytics, widening market insights, and offering sustainability-driven features to encourage agricultural innovation.

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K Faseeha Naaz

Shreya Paul

Inzemam Raza

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CHAPTER-1

INTRODUCTION

Agriculture has traditionally been seen as an essential component of the Indian economy, creating jobs while adding significantly to the country's GDP. Despite its crucial importance, the farming industry faces significant problems, especially for small and medium-sized farmers. These obstacles include poor margins of profit, fluctuating market pricing, and a lack of trustworthy and timely market data. These obstacles frequently put producers at a disadvantage, diminishing their standard of living and limiting their capacity to succeed in a competitive market. To solve these difficulties, Kisan Buddy emerges as an innovative digital platform that aims to empower farmers and transform the agricultural economy. Kisan Buddy uses innovative technology to establish a clear, fair, and productive market for consumers, farmers, and other supply chain stakeholders.

1.1 The Purpose of Kisan Buddy

Kisan Buddy's primary goal is to empower farmers by introducing a bidding feature that ensures fair and competitive pricing for their produce. The program enables producers to sell their harvests to the highest bidder, eliminating middleman exploitation and fostering a more equitable agricultural economy. In addition, Kisan Buddy provides farmers with real-time mandi (market) information, helping them identify nearby markets that offer the best pricing. The platform also offers location and transportation assistance, further enabling farmers to make informed decisions and optimize their earnings effectively.

1.2 Main Features and Functions

Kisan Buddy includes a variety of features designed to meet the specific demands of agricultural producers and other stakeholders. This includes:

Market Analysis: The program gives farmers information about mandis, allowing them to make better decisions regarding where and when to sell their crops. Kisan Buddy helps producers maximize their profitability by providing information on expenses and market profits.

Bidding System: A transparent bid system connects producers with buyers who are eager to pay a fair price for excellent produce. This function not only assures fair pricing but also builds confidence between both buyers and sellers.

User Access: The software allows users to compare costs, assess the quality of produce, and make direct purchases from farmers. As a result, farmers and consumers receive better value since middlemen play a smaller role.

Ease of Application: Kisan Buddy was created with inclusion and simplicity in mind, accommodating users with different levels of digital literacy. Farmers, even those who are not familiar with cutting-edge technology, may easily traverse the platform thanks to its user-friendly layout.

1.3 Advantages for Participants

Kisan Buddy offers customized advantages to each of the major participants in the agriculture supply chain:

Producers:

1. Kisan Buddy helps farmers maximize their revenue by providing insights into their expenditure and profit. The platform also facilitates bulk sales to desired customers, ensuring better opportunities and streamlined transactions.
2. Farmers can avoid costly travel and unsold produce by finalizing deals with confirmed buyers at nearby markets.
3. A decreased reliance on go-betweens and middlemen.
4. Market data is available in real-time to help with better decision-making.

Consumers:

1. Consumers get the say in the pricing as they can place their own prices for farmers to consider.
2. Consumers can view all the farmers selling a desired crop by search tool.
3. Availability of affordable, premium produce.
4. Guarantee of genuine and fresh farm products.
5. Open communication with farmers and transparent prices.

Businesses and Traders:

- Direct access to farmers and simplified procurement procedures.
- Chances to form enduring alliances with trustworthy providers.

1.4 Impact and Vision

Kisan Buddy wants to revolutionize the Indian agriculture industry by developing a platform that promotes efficiency, equity, and transparency. The platform's long-term goals consist of:

1. **Educating Farmers:** Kisan Buddy wants to give farmers the information and resources they need to make wise choices, increasing their profitability and lowering their financial risks.
2. **Promoting Cooperation:** Kisan Buddy promotes cooperative activities that are advantageous to all parties involved by establishing direct linkages between farmers, traders, and consumers.
3. **Building Trust:** Kisan Buddy builds trust with all parties involved by being transparent about price and quality control, which promotes recurring business and long-term cooperation.
4. **Supporting the Growth of the Economy:** Kisan Buddy serves India's larger developmental objectives and promotes national economic growth by improving market efficiency and elevating the agricultural community.

CHAPTER-2

LITERATURE REVIEW

The agricultural sector remains vital worldwide, providing livelihoods for countless individuals and contributing significantly to economic stability. Nevertheless, farmers encounter ongoing obstacles, including unpredictable pricing, inefficient resource use, restricted market access, and unreliable information, which impede productivity and profitability [1][2]. Addressing these challenges is crucial for ensuring sustainable agriculture and food security. Current studies emphasize the transformative impact of technological progress in tackling these issues. Mobile apps like SMART KISAN and Farm Connect have shown the benefits of linking farmers to essential information and resources for managing their produce.

Additionally, research on AI-driven solutions such as Kisan Se Kisan Tak underscores the importance of incorporating user-friendly technology to boost farmer engagement [3]. Building on these advancements, Kisan Buddy offers a comprehensive platform that integrates real-time data analysis with features to assist farmers. By providing transportation information, bidding capabilities, and market insights, Kisan Buddy enables farmers to make informed decisions. This study investigates Kisan Buddy's role in revolutionizing agriculture through technological innovation. By combining insights from recent developments and exploring the platform's design and applications, the research aims to demonstrate how Kisan Buddy bridges the gap between conventional farming knowledge and modern agricultural technologies, laying the groundwork for a more sustainable and resilient agricultural future.

2.1 The Role of Digital Technology in Agriculture

In recent years, the agricultural sector has seen a significant increase in the use of digital technology, with mobile apps becoming a crucial tool for farmer support. These applications contribute to improved agricultural productivity, and operational efficiency, and provide farmers with access to vital resources like weather predictions, market rates, and farming guidance. Numerous research studies have highlighted the transformative potential of mobile applications in farming practices, especially in developing nations.

2.2 Present Agricultural Mobile Applications

Various mobile applications have been created to support farmers' daily agricultural tasks. For instance, the SMART KISAN app offers features such as weather forecasts, market price updates, and crop management like disease identification and prevention, with a user-friendly interface designed for farmers with limited tech proficiency [1]. Similarly, Farm Connect enables direct farmer-consumer interactions, allowing farmers to circumvent traditional middlemen and obtain better prices for their produce, which has proven advantageous in reducing the gap between producers and consumers [2].

2.3 Peer-to-peer Platforms and AI

The Kisan Se Kisan Tak (KSKT) app employs artificial intelligence (AI) to create a peer-to-peer network for farmers to exchange knowledge, experiences, and solutions. While this promotes collaboration, the app's restricted ability to offer localized, region-specific advice remains a significant challenge [3]. Additionally, immersive technologies like virtual reality (VR) and augmented reality (AR) are being explored for agricultural training, offering interactive learning experiences that could enhance farmers' skills and knowledge. However, the high costs and infrastructure requirements associated with VR and AR technologies limit their widespread implementation in rural areas [4].

2.4 Farmers' Views on Adoption of Digital Technology

Multiple studies have focused on understanding farmers' views regarding the adoption of digital technologies in agriculture. These studies emphasize the diverse needs of farmers, particularly those in underserved and remote regions, where digital literacy and infrastructure continue to be significant obstacles to technology adoption. Research indicates that agricultural apps need to be flexible and user-friendly to accommodate farmers with varying levels of digital literacy and access to technology [5][6].

2.5 Research Gaps

While tremendous progress has been achieved in the creation of agricultural mobile applications, some gaps remain in current solutions. Most applications focus on giving basic information such as weather updates or market pricing, but they frequently lack advanced capabilities that might have a direct influence on farmers' productivity and earnings. Many existing platforms lack key capabilities such as quality inspections, price comparisons, and transportation specifics. Furthermore, while some apps provide direct market access, a strong bidding component that assures competitive pricing is frequently absent. This research tries to fill these gaps by including numerous critical elements that are currently missing from most agricultural apps.

The proposed platform would include a produce and ensure that they get fair rates. A bidding option will be added to enable farmers to compete in a highly competitive market, ensuring they obtain the greatest price for their produce. Furthermore, the transportation information feature will help farmers discover the best transportation choices, improve logistics, and reduce expenses. Finally, farmers will be able to compare pricing across multiple markets, allowing them to make more educated judgments about where they should market their produce. These features are intended to give an expanded solution, meeting many demands that are frequently missed by present apps.

In conclusion, the '**Kisan Buddy**' project fills in the gaps in the existing agricultural marketplace by combining transparent bidding, top bidder listings, location-based connectivity, profit optimization, and easy login and registration into a single, integrated platform. The goal of this approach is to empower farmers and build a more just and productive agricultural ecosystem.

2.6 Summary of the References

Title	Focus	Results	Drawbacks	Year
Proprietor: A Farmer Assistance Smartphone Application with Crop Planner, Crop Disease Help...	Smartphone app for crop planning, disease assistance, and agri-expert search.	Provided features for crop suggestion and disease help, improving agricultural decisions.	Limited scalability and reliance on user literacy for full utilization.	2024
Knowledge of Mobile Applications in Digital Agriculture among Haryana Farmers	Assessment of mobile app knowledge in agriculture from a socio-economic perspective.	Highlighted gaps in digital literacy and mobile app usage among farmers in Haryana.	Results are region-specific, limiting generalizability to other areas.	2024
SMART KISAN: A Mobile App for Farmers' Assistance in Agricultural Activities	Mobile app to assist farmers in daily agricultural tasks.	Enhanced agricultural productivity with better information sharing.	Focused on task assistance but lacked advanced analytics or AI for predictive insights.	2023
Farm Connect Application: Bridging the Gap Between Farmers and Consumers Through Digital Tech.	Digital platform connecting farmers directly to consumers.	Improved market access for farmers and reduced intermediary costs.	Limited adoption in rural areas due to technology barriers.	2023

A study on farmers' perceptions about the scope of the Kisan Suvidha App...	Evaluation of the Kisan Suvidha App for agricultural sustainability.	Positive perception of app's utility in sustainable agriculture practices.	Limited user base and low awareness among farmers about app features.	2023
Multi-Agent-Based Optimal Bidding Strategy for Power Producer in Power Market	Strategy development for power producers in energy markets.	Developed optimal bidding strategy, increasing efficiency in power market participation.	Not directly related to agriculture or farmer-specific issues.	2023
Design and Implementation of AI-based Kisan Se Kisan Tak (KSKT) Mobile App	AI-powered app to connect farmers and share agricultural knowledge.	Facilitated peer-to-peer knowledge sharing among farmers.	Limited evaluation of long-term impact on farming sustainability.	2022
Smart Agriculture Adoption Based on Farmer's Perspective	Analysis of smart agriculture practices based on farmer feedback.	Identified key factors affecting smart agriculture adoption, like affordability and awareness.	Did not provide concrete solutions for affordability challenges in adopting smart technologies.	2022
Status of Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme	Analysis of PM-KISAN scheme's impact on farmers.	Highlighted financial support benefits for small and marginal farmers.	Focused only on financial assistance, lacking insights on non-monetary aspects of farmer welfare.	2022
Immersive Technologies for Development: An Analysis of Agriculture	Use of immersive technologies in agricultural development.	Explored potential of AR/VR in enhancing agricultural education and practices.	Lack of real-world implementation and cost concerns for AR/VR tools in rural settings.	2020

CHAPTER - 3

RESEARCH GAPS OF EXISTING METHODS

1. Proprietor: A Farmer Assistance Smartphone Application

- **Gaps:**
 - This app does not provide price discovery mechanisms to help farmers determine optimal product pricing.
 - There are no provisions for facilitating bulk selling to desired customers or markets.
 - There is minimal incorporation of marketing-centric features like profit estimation, market prices, and nearest market information.

2. Knowledge of Mobile Applications in Digital Agriculture among Haryana Farmers

- **Gaps:**
 - The research overlooks mobile applications enabling bulk sales to large buyers or aggregators.
 - The study does not examine the role of mobile phones in creating digital platforms for competitive bidding or direct transactions.
 - The focus is on accessing agricultural information, but there is no exploration of mobile-enabled tools to convert information into actionable market strategies.
 - The study does not address assistance in coordinating transportation and logistics for better market access.

3. SMART KISAN: A Mobile App for Farmers' Assistance

- **Gaps:**
 - The study does not address how the app can connect farmers directly with markets or buyers to sell their produce effectively.

- The research does not consider the need for features that enable farmers to sell their produce in bulk to large buyers or aggregators.
- There is no exploration of digital bidding platforms or chatbots facilitating direct negotiations between farmers and buyers.
- The app does not provide solutions for transportation or distribution coordination, which are critical for reaching broader markets.

4. Farm Connect Application

- **Gaps:**

- The research does not address the need for digital bidding or negotiation platforms that facilitate direct transactions between farmers and retailers or food processors.
- There is limited focus on logistics support or transportation solutions to help farmers efficiently deliver produce to retailers or processing units.
- The app primarily emphasizes connectivity.
- The study does not provide pricing information or comparative price analysis, which are essential for helping farmers make informed selling decisions.

5. Kisan Suvidha App

- **Gaps:**

- The study does not address the potential for integrating **marketplace connectivity**, which would enable farmers to directly engage with buyers directly, ensuring better sales opportunities and revenue optimization.
- There is no discussion about profit maximization.
- The sales aspect is not given optimal focus in this research.

6. Multi-Agent-Based Optimal Bidding Strategy for Power Producers

- **Gaps:**

- The impact of bidding strategies on **customer satisfaction** and **retention** is not considered, and opportunities to align producer strategies with

consumer needs for long-term loyalty are missing.

- There is no mention of **consumer-centric approaches** in the bidding process, which could improve customer experience and align pricing with customer expectations.
- There is limited exploration of **post-bidding** features like assistance on expected profit and expenses.

7. Kisan Se Kisan Tak (KSKT) Mobile App

- **Gaps:**

- The app does not address how logistics and transportation could be optimized for farmers, which is a key element in improving delivery efficiency and reducing costs.
- Focuses only on knowledge sharing; lacks integrated market solutions or financial tools.
- The app lacks a feature for price discovery or bidding, which could allow farmers to get better pricing by connecting directly with buyers or other farmers.

8. Smart Agriculture Adoption Based on Farmer's Perspective

- **Gaps:**

- The research on this application mainly focuses on assisting farmers with production-based assistance for their crops like tools and government services available,
- It neglects profit maximization capability for the farmers through sales.

9. Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme

- **Gaps:**

- This research does not address the need for understanding consumer demands and preferences, which could help farmers tailor their production and sale efforts.

- The study does not address how PM-Kisan beneficiaries in the North Eastern states can be supported with marketing strategies or platforms to sell their produce effectively.
- The research does not address how to solve transportation and logistical challenges faced by farmers in remote regions, which could impact the timely delivery and quality of farm produce.

10. Immersive Technologies for Development in Agriculture

- **Gaps:**
 - The research does not mention how immersive technologies can integrate with e-commerce platforms, enabling farmers to directly sell their products to a larger consumer base.

By addressing a few of these gaps, Kisan Buddy can establish itself as a transformative platform, bridging the disconnects between farmers, markets, and consumers.

CHAPTER-4

PROPOSED METHODOLOGY

4.1 Software and Hardware Components -

- **Software:**

- Android Studio (4.2 or newer): This serves as the primary development platform for coding, troubleshooting, and constructing the application.
- Firebase SDK: This is incorporated into Android Studio to facilitate smooth user verification, instantaneous data updates, and database administration.
- Google Maps API Key: This is employed to incorporate location-based functionalities, such as address conversion, cartography, and distance computation.

- **Hardware:**

- Mobile Device: An Android smartphone or tablet running version 7.0 or later is needed to operate and evaluate the application.
- Computer: A desktop or laptop with at least 8GB of memory and 10GB of available storage is required for development work using Android Studio.
- Internet Access: A connection is essential for utilizing Firebase services, and APIs, and enabling real-time data synchronization throughout the development and deployment process.

4.2 Methodology -

- **Login Module:**

- Firebase Authentication: To enable user sign-in using email and password, the Login module makes use of Firebase Authentication. It looks up the individual's role (Producer or Consumer) in the Fire store after a successful login.
- Steps:
 - Users provide their email address and password in an input box at the beginning of the login process.
 - The user's credentials are authenticated using Firebase Auth upon form submission.

Firestore retrieves a user's job (Manufacturer or User) from the consumer's collection following authentication.

- The app either reroutes to the ProducerDashboard or the ConsumerDashboard, depending on the role.

- **Profile Module:**

- Retrieve and Save User Data: The Profile module lets users see and modify their Firestore-stored profile data, which includes personal information like name, age, gender, and Aadhaar number.
- Steps:
 - The ProfileActivity uses the user's UID (unique identifier from Firebase Authentication) to access user data from Firestore.
 - While editable elements like name, age, gender, and Aadhaar are supplied through input forms, read-only fields like email and user type are included in the displayed data.
 - The update function allows the user to make changes to this data, which is then stored back to Firestore.

- **Sell Crop Module:**

- Storing Crop Information: Producers can list crops for sale using this module. For later use by purchasers or other interested parties, the crop details are kept in the Firestore.
- Steps:
 - Producers enter crop information in the SellActivity, including crop name, amount, weight, and price per kilogram.
 - Firebase Authentication retrieves the logged-in producer's email address and links it to the crop data.
 - In Firestore, the crop information is added to the crop collection after being contained in a Crop model object.
 - After feedback has been successfully added, the producer receives a success message and is taken back to the Producer Dashboard.

- **Producer Dashboard Implementation Process:**

- Producers (farmers) can examine and manage their crops using the Producer Dashboard activity in the Kisan Buddy app. Producers can view a list of crops linked to their account on the dashboard.
- To get comprehensive client details for bidding, click on a crop.
- To engage with agricultural data, use Firebase Firestore.
- FirebaseCrop and user data are stored in Firestore, which is accessed by Firestore.
- To retrieve the producer's email, FirebaseAuth authentication is utilized for user authentication.
- A list of crops is displayed by RecyclerView.
- CropAdapter: A custom adapter that shows crop data when used with RecyclerView.
- The fetchCropsForProducer () method retrieves crops that are directly linked to the producer's email address that is currently logged in.
- Crops where the producerEmail matches the email address of the logged-in user are retrieved by the query.
- Clicking on a crop item sends an intent to CustomerListActivity, which passes the crop's document ID for more information.
- Navigation between the app's many sections, such as the home screen, profile, etc., is made possible using bottomNavigationView.

- **Bidding Functionality:**

- The Android app incorporates a bidding system for crops, accessible to both producers and consumers. This feature comprises UI elements for showcasing crop information and input fields for bid submission.
- Display Components:
 - Crop details are presented using TextViews (cropNameTextView, cropPriceTextView, cropQuantityTextView, maxBidderTextView).
- Input Fields:
 - EditTexts enable users to enter bid amounts using the (consumerPriceEditText, maxBidderPriceEditText, and also another two fields are the secondMaxBidderPriceEditText, thirdMaxBidderPriceEditText).

- **Retrieving Crop Information:**

- Firestore Database Queries: Crop details are obtained using `Firestore.collection("crops").document(documentId).get()`, based on the `documentId` provided in the Intent.
- Interface Updates: The `updateUI()` function refreshes the crop data displayed on the screen.
- `fetchTopBidders()` retrieves the three highest bidders, sorted by bid amount.
- Bids are arranged in descending order (`orderBy("bidAmount", Query.Direction.DESCENDING)`) to identify the top three.
- New bids are recorded in the bidder's sub-collection within a specific crop document in Firestore.
- User information (name, email) is extracted from the user collection to link with bids.

- **Location Services via Google Maps API:**

- `MapViewActivity` incorporates Google Maps API to display customer and producer locations visually.
- Setup: A `MapView` layout is initialized and linked to Google Maps API using `getMapAsync()`.
- Location Indicators: Markers represent different locations. Green icons (`HUE_GREEN`) denote producers, while blue icons (`HUE_BLUE`) indicate nearby markets.
- Marker Placement: `googleMap.addMarker()` positions markers on the map.

- **Expense Calculator Module:**

- Expense Calculation Module is designed to streamline the process of calculating the total costs and profits associated with agricultural transactions, while also providing optimized vehicle suggestions for transportation.
- This module collects essential inputs such as customer and producer emails, crop quantity, crop weight, transportation costs, additional expenses, and the bid amount.

- Using this data, it computes the **total expenses** by summing up the crop cost, transportation cost, and additional expenses. The **profit** is then calculated as the difference between the bid amount and the total expenses, allowing producers to easily assess their earnings.
- To enhance usability, the module includes a vehicle suggestion feature that determines the best transportation option based on the crop weight. For instance, a small truck may be suggested for weights up to 500 kg, while larger trucks are recommended for heavier loads.
- **Utilized APIs:**
 - Google Maps API Suite:
 - Geocoding API: Transforms addresses into geographic coordinates (latitude and longitude).
 - Places API: Offers information about geographic locations, including nearby markets.
 - Distance Matrix API: Determines travel distance and duration between two points.
 - Maps SDK for Android: Supplies tools and capabilities for embedding map features in Android applications.
- **Technologies and Components Utilized:**
 - Firebase Firestore: Manages data for crops, users, and bids.
 - Firebase Authentication: Handles user verification and retrieves user information.
 - RecyclerView: Employed with a custom adapter (CropAdapter) to present a structured list of crops.
 - Custom Adapter: Manages the population and interaction of RecyclerView items with crop information.
 - Functionalities Offered:
 - Showcases crops linked to a particular producer.
 - Enables interaction with crop data through RecyclerView.
 - Supports navigation to detailed customer lists for bidding purposes.
 - Operational Mechanism:
 - Upon ProducerDashboard creation: Initializes Firebase services and establishes the user interface.

- Retrieves crops for the currently authenticated producer using Firestore.
- Utilizes a RecyclerView to display these crops via a custom adapter.
- When a crop is chosen, an Intent navigates to CustomerListActivity, transmitting the crop document ID.

CHAPTER – 5

OBJECTIVES

1. Empower Agricultural Producers:

Offer farmers a platform to showcase their goods, participate in competitive pricing, and optimize their earnings through informed decision-making.

2. Enable Transparent Exchanges:

Guarantee fairness in buying and selling by implementing features such as bidding, displaying top bidders, and providing real-time updates.

3. Improve Accessibility:

Create an intuitive and user-friendly system that enables easy login, registration, and navigation for both farmers and consumers, ensuring inclusivity for all users.

4. Foster Efficient Market Connections:

Utilize location-based services to link farmers with buyers, transportation providers, and nearby markets, minimizing logistical challenges and expenses.

5. Maximize Profit Margins:

Equip farmers with tools to examine market trends, decrease overhead costs, and make expense estimations to maximize their earnings.

6. Streamline Product Discovery:

Provide consumers with advanced search capabilities, filters, and sorting options to quickly and conveniently locate quality agricultural products.

7. Promote Digital Inclusion:

Introduce technology to small-scale farmers by offering a straightforward platform with essential features, assisting their transition to a digital economy.

By achieving these objectives, Kisan Buddy aims to revolutionize the agricultural landscape by empowering farmers, enhancing market efficiency, and ensuring consumer satisfaction.

CHAPTER – 6

SYSTEM DESIGN & IMPLEMENTATION

6.1 Module wise Implementation -

- **User Registration and Authentication Module**
 - Purpose: Manages user sign-up, role assignment, and authentication using Firebase Authentication and Firestore.
 - Implementation: The Registration activity oversees user registration, collecting input for email, password, and role (e.g., Farmer or Buyer).
 - Firebase Authentication is employed for account creation, while Firestore stores additional user details such as their role.

- **User Profile Management Module**
 - Purpose: Allows users to view and modify their personal information, including name, age, gender, and Aadhaar number, stored in Firestore.
 - Implementation: The ProfileActivity retrieves user data from Firestore and displays it. Users can update their profile information, which is then saved back to the Firestore database.

- **Crop Selling Module**
 - Purpose: Enables farmers to list crops for sale, specifying details such as crop name, quantity, and weight.
 - Implementation: The SellActivity gathers crop details and saves them to Firestore, associating each crop entry with the logged-in farmer's email for tracking purposes.

- **Splash Screen Component**
 - Objective: Improves user experience by showing a branded loading screen during app initialization.
 - Execution: The SplashActivity employs a Handler to postpone transition to the login

interface for three seconds.

- **Navigation Component**

- Objective: Enables smooth transitions between various app screens using a BottomNavigationView.
- Execution: A BottomNavigationHelper class is utilized to configure and oversee navigation logic. Each screen incorporates the BottomNavigationView for uniform navigation.

- **Firebase Integration Component**

- Objective: Incorporates Firebase services, including Authentication and Firestore, to manage users and store data.
- Execution: Firebase Authentication handles user login and registration processes. Firestore serves as a database for storing user profiles, roles, and crop information.

- **User Authentication and Profile Administration**

- This component ensures protected and individualized access for all platform users, including farmers and consumers.
- Key features comprise user registration for new user onboarding, secure login for safe access, and profile customization allowing users to personalize their experience.
- Role-based access ensures specific functions are available based on whether the user is a farmer or consumer, enhancing usability and security.
- Advanced account protection measures are implemented to safeguard user data and maintain system trust.

- **Product Catalogue and Administration**

- This component allows producers to efficiently list and manage their crops for potential buyers.
- Farmers can add new products with crucial details such as quantity, quality, and price.
- Inventory management assists producers in monitoring available stock and updating listings as required.
- Quality control ensures that only high-standard products are listed, boosting buyer

confidence.

- Availability indicators allow producers to mark their products as available, sold out, or under negotiation, offering real-time updates for buyers.

- **Product Exploration and Search**

- Designed for consumers, this component helps them swiftly and easily locate desired products.
- Search functionality enables users to find products by name, category, or other criteria.
- Advanced filters allow consumers to narrow their searches based on attributes like price range, product type, or location.
- Sorting options, such as arranging by price, quality, or availability, improve the browsing experience.
- Detailed product views offer comprehensive information, including images, descriptions, pricing, and seller details.

- **Bidding and Listing**

- This component supports dynamic pricing by enabling producers and consumers to engage in a competitive bidding process.
- Farmers can initiate bids for their products, inviting buyers to place offers.
- Counteroffers facilitate real-time negotiations between buyers and sellers to reach mutually beneficial agreements.
- Real-time updates notify users about bid statuses and any changes, ensuring they stay informed.
- Time-limited offers create urgency and encourage quicker decision-making by both parties.

- **The Location Access feature**

- It enhances connectivity by incorporating location-based services into the platform.
- It allows farmers and consumers to easily find nearby buyers, sellers, or transportation services.
- This feature optimizes the supply chain by linking users within specific geographical areas, thereby reducing transportation expenses and delivery times.

- **The Profit Maximization module**

- It assists farmers in boosting their income by offering tools and insights for more informed decision-making.
- It helps farmers discover nearby markets or distribution centers to broaden their reach.
- By examining market trends, bidding patterns, and transportation costs, the module suggests the most lucrative options.
- Additionally, it identifies ways to cut costs, such as improving logistics or minimizing intermediaries.

Continued development of this framework can transform the app into a comprehensive platform for farmers and vendors, providing real-time information, a marketplace, and other valuable features.

6.2 Design Procedure –

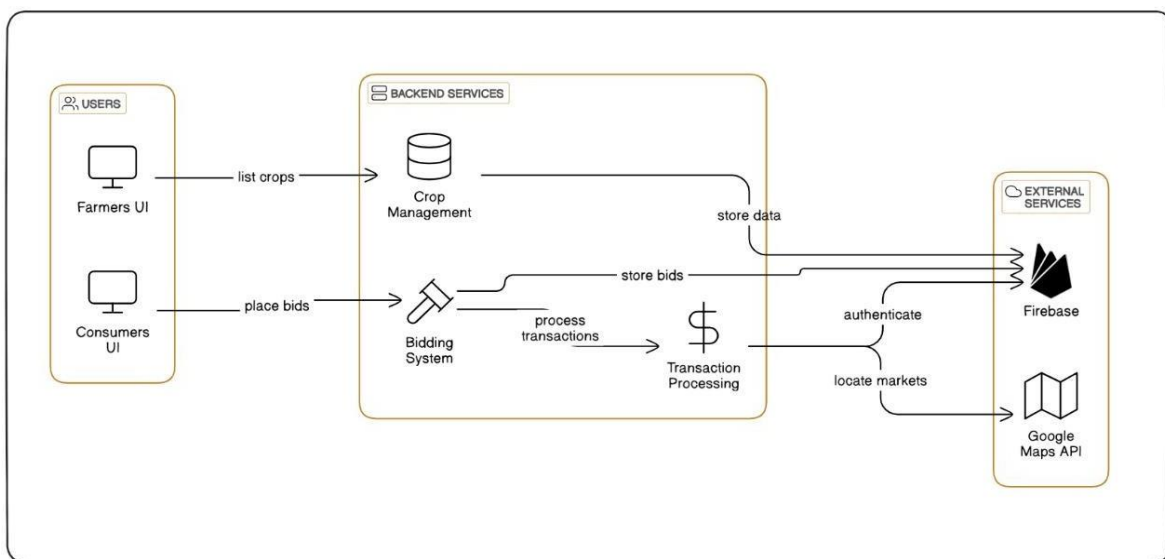


Figure 6.2 Architecture diagram

The application's design incorporates various Android UI components to create an intuitive, user-friendly interface that accommodates different functionalities. Constraint Layout serves as the primary layout container across all screens, ensuring a flexible and responsive design.

- **Splash screen**

It Introduces the application with an aesthetically pleasing layout, featuring a centrally positioned image and a tagline. An `ImageView` is placed in the center with appropriate scaling to fit the design theme. Below it, a `TextView` displays the application's tagline, "Connecting farmers to the future of agriculture," emphasizing the app's purpose and branding. The design maintains a visual hierarchy through proportional spacing and alignment.

- **Top bar**

A consistent Top Bar is utilized in various activities for navigation and context. It consists of a `LinearLayout` containing an `ImageView` for a back button and a `TextView` for the page title. The top bar is styled with a custom color (button color) to match the overall theme, with padding ensuring proper element alignment. This design choice facilitates easy navigation and maintains uniformity across pages.

- **Bottom Navigation**

The Bottom Navigation is implemented using `BottomNavigationView`, enabling smooth transitions between the application's main features. Positioned at the screen's bottom, it is styled with a background color complementing the top bar. The menu items in `bottom_nav_menu` are strategically chosen to represent core functionalities, providing users with easy access.

- **Login and Registration**

The Registration and Login screens adopt a vertical layout, organized with `EditText` fields for input and `RadioGroup` for role selection. `LinearLayout` ensures orderly stacking of elements such as email and password inputs, and user role options (consumer/producer). Registration and login buttons feature rounded corners (`rounded_button`) and distinct elevations for a modern, clickable design. Text hints and colors maintain accessibility, while margins and padding provide a clutter-free experience.

- **Profile Section**

The user profile interface combines static and editable fields to display and modify personal information. A consistent header and footer are incorporated. The central section, organized in a vertical layout, contains fields for email, user category, name, age, gender, and Aadhar information. A "Save" button becomes visible when changes are made, enhancing user interaction. Appropriate spacing and alignment create a well-organized design.

- **Crop Information and Sales:**

The crop-related form follows a logical sequence. Fields such as crop name, quantity, and weight are presented using text labels and input boxes. The save button features rounded corners and matches the overall design theme. Descriptive labels like "Crop Name" provide guidance, and all elements are contained within a flexible vertical layout that adapts to various screen sizes.

- **Auction System:**

The bidding feature enables farmers to list their produce and receive real-time offers from buyers. Farmers can set a minimum price for their crops. The system provides live updates on the highest bids, allowing farmers to make informed decisions as the auction progresses.

- **Top Bidders Display:**

This feature presents a real-time leaderboard of the top bidders, updating as new offers are made. It ranks the top 3 bidders based on their profit margins, fostering competition and providing transparency on the highest returns.

- **Profit Optimization Tool:**

This tool calculates net profits using current market prices and production costs. By incorporating historical data, the system forecasts profitability for various crops, considering factors like seasonality, resource utilization, and market trends. Farmers can compare potential profits from different crops to inform their decisions.

- **Crop List Item Design:**

The individual crop listing displays details such as the crop name, price, and seller information. Elements are arranged using a flexible layout to ensure proper alignment across different screen sizes. Crop names are emphasized with bold text, while other details are subtly aligned for a professional appearance.

- **Visual Consistency:**

A unified design is maintained throughout the application with a consistent color scheme, typography, and rounded elements. Custom visual resources like rounded buttons and input fields enhance the aesthetic appeal. Flexible layouts ensure responsiveness, while appropriate spacing prevents visual clutter.

This implementation strikes a balance between visual appeal and functionality, resulting in a user-friendly and aesthetically pleasing application design.

CHAPTER – 7

TIMELINE FOR EXECUTION OF PROJECT (GANTT CHART)

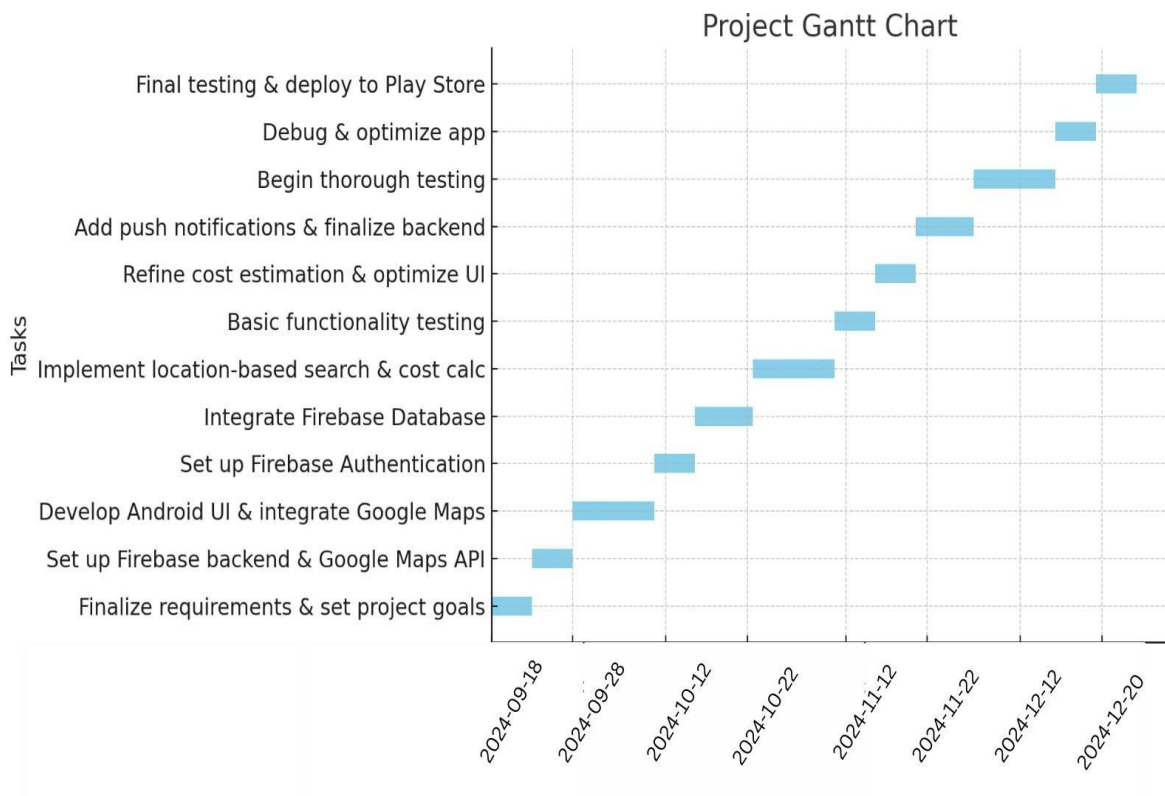


Figure 7.1 Gantt Chart

CHAPTER – 8

OUTCOMES

- **Streamlined Bidding and Sales Process**

- Farmers can conveniently settle bids based on customer price offers, resulting in a more balanced and transparent process that benefits both parties.

- **Reduced Financial Losses**

- Direct sales to customers reduce the risks of unsold produce and the associated costs of transporting goods to traditional marketplaces, ensuring higher profitability for farmers.

- **Enhanced Price Negotiation**

- The platform's integration of customer price choices with optimal bidding strategies enables farmers to negotiate fair and favorable terms, promoting mutually beneficial sales transactions.

- **Lowered Operational Costs**

- By eliminating the need for excessive travel and middlemen, farmers save on transportation and logistics costs, contributing to better financial management.

- **Improved Market Connectivity**

- The platform enhances interactions between customers and producers, enabling a direct connection that fosters better pricing transparency and informed decision-making for both parties.

- **Informed Financial Decision-Making**

- Farmers can utilize profit estimation tools to make more informed financial plans, maximize their earnings, and manage costs effectively, leading to better overall economic outcomes.

- **Digital Empowerment and Inclusion:**

- Enhanced Digital Literacy: Training initiatives enhance farmers' proficiency with digital platforms.
- Accessible Interface: Interfaces that are multilingual and audio-guided guarantee that farmers with different reading levels are included.

- **Increased Independence of Farmers:**

- Empowered Decision-Making: By giving farmers more authority over the where, when, and price at which to sell their produce, middlemen are less likely to take advantage of them.
- Farmers may confidently negotiate better bargains by using tools like price trend research and quality certification, which allow for independent market participation.
- The Kisan Buddy initiative aims to change the agricultural landscape by establishing a sustainable, productive, and inclusive ecosystem for farmers, stakeholders, and consumers.

Both farmers and consumers may look forward to a sustainable and successful future thanks to these results, which establish Kisan Buddy as a game-changing solution to pressing issues in the agriculture industry.

CHAPTER – 9

RESULTS AND DISCUSSIONS

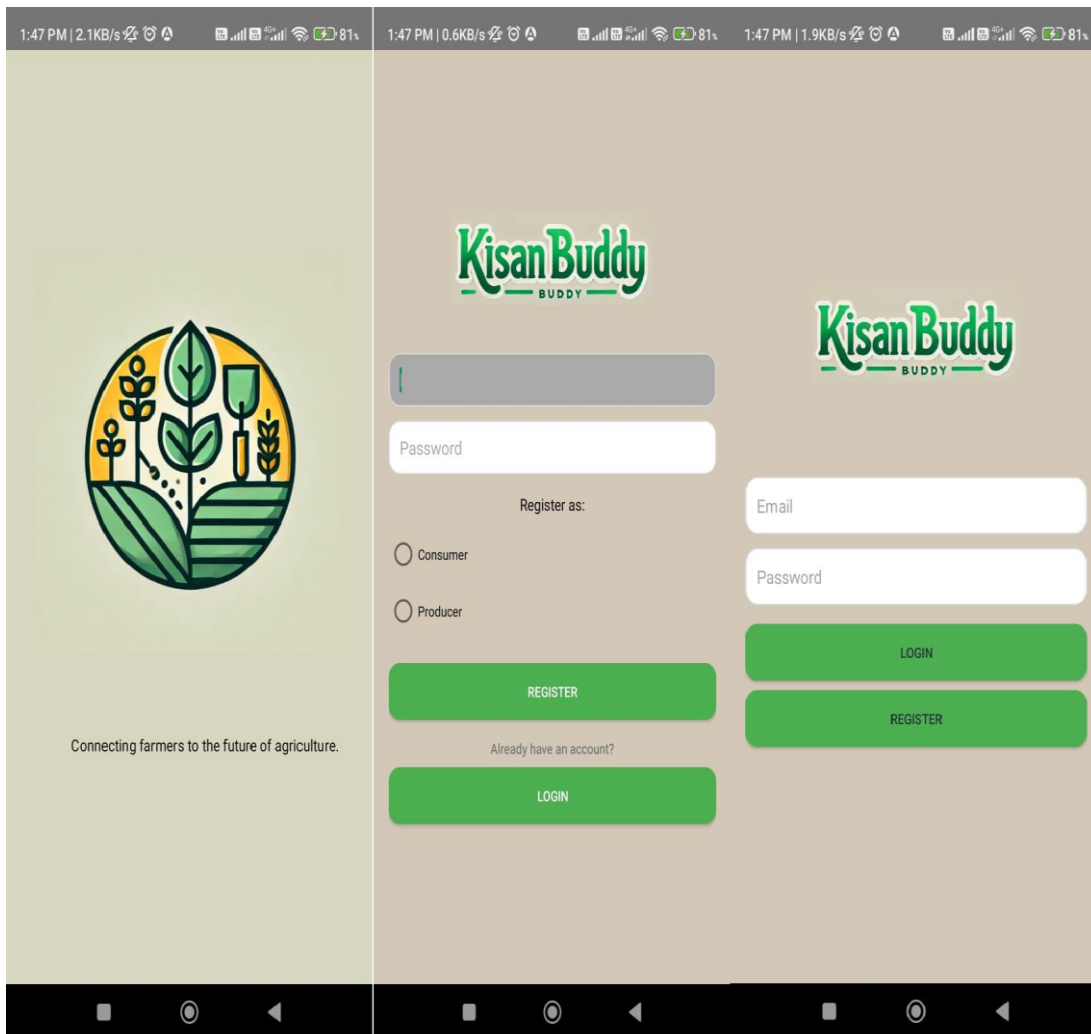


Fig 9.1 Splash Screen

Fig 9.2 Registration Page

Fig 9.3 Login Page

Discussion:

The logo and motto, "Connecting farmers to the future of agriculture," are prominently shown for three seconds on the Kisan Buddy app's splash screen. Before going to the login page, this screen improves the user experience by offering a polished and aesthetically pleasing introduction.

Both producers (farmers) and customers (vendors) have their own login page. Clear email and password entry fields, a noticeable login button, and a link to the registration page are all features shared by both versions. Users are taken to dashboards customized for their roles after successfully logging in.

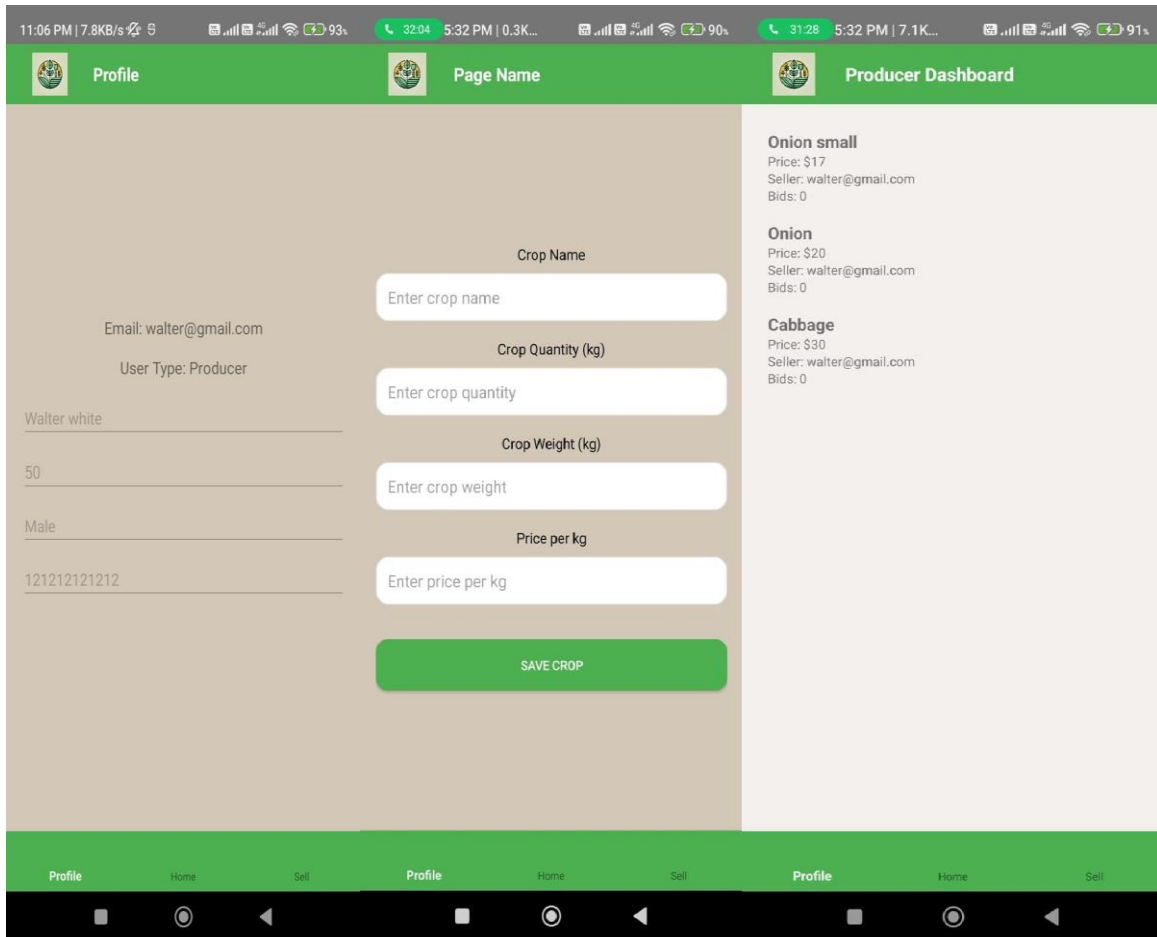


Fig 9.4 Profile Section

Fig 9.5 Crop entry Section

Fig 9.6 Producer Dashboard

Discussion:

Users can easily manage personal information, examine account details, and adjust preferences on the profile page. With the use of the producer dashboard, which offers a thorough overview that includes crop names, seller information, pricing, and bids, farmers can efficiently monitor and manage their listings. In order to provide a smooth listing for buyers and bidders, the crop entry section provides an easy-to-use interface for entering crop details including name, quantity, weight, and price per kilogram.

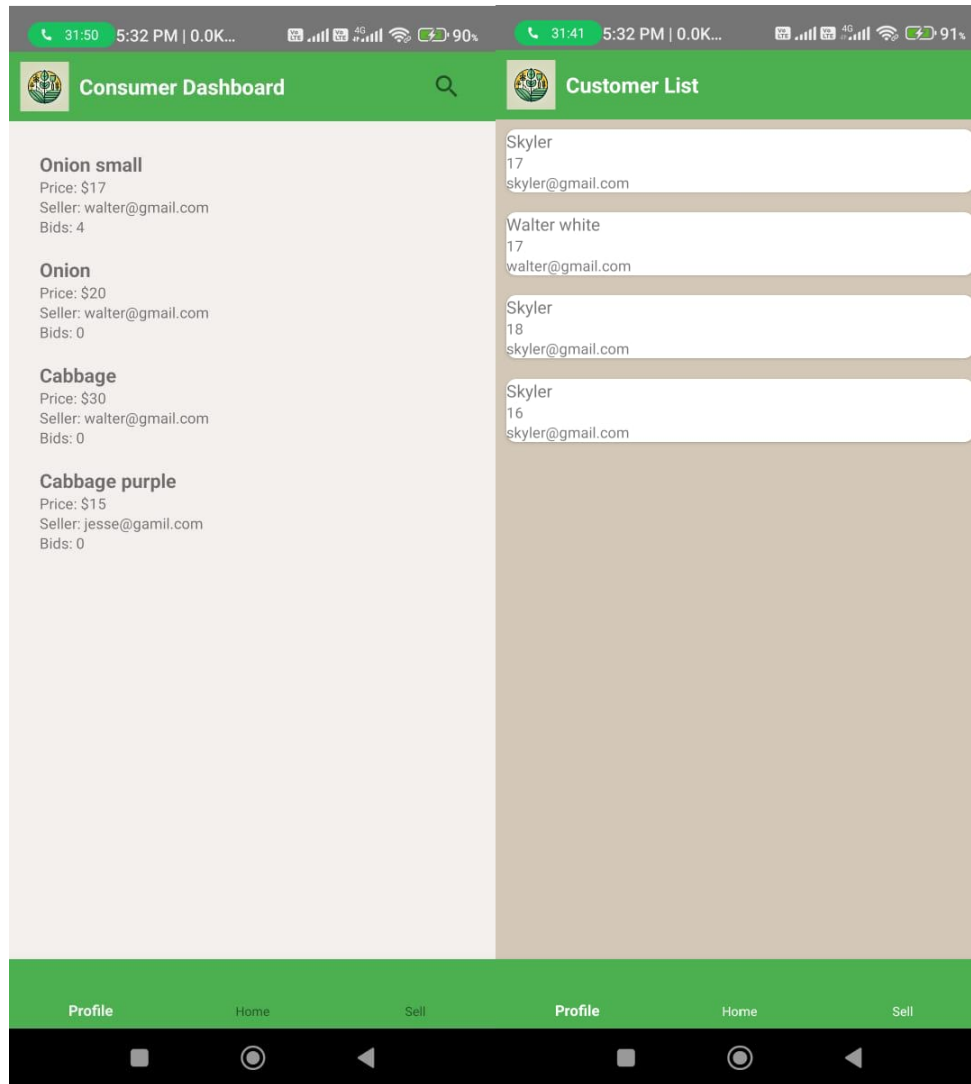


Fig 9.7 Consumer Dashboard

Fig 9.8 Customer List

Discussion:

Customers may easily browse and bid on available crops thanks to the consumer dashboard, which offers an ordered view of them along with crop names, sellers, prices, and bids. For effective tracking and communication, the customer list page presents an extensive list of registered customers along with their names, bid amounts, and email addresses.

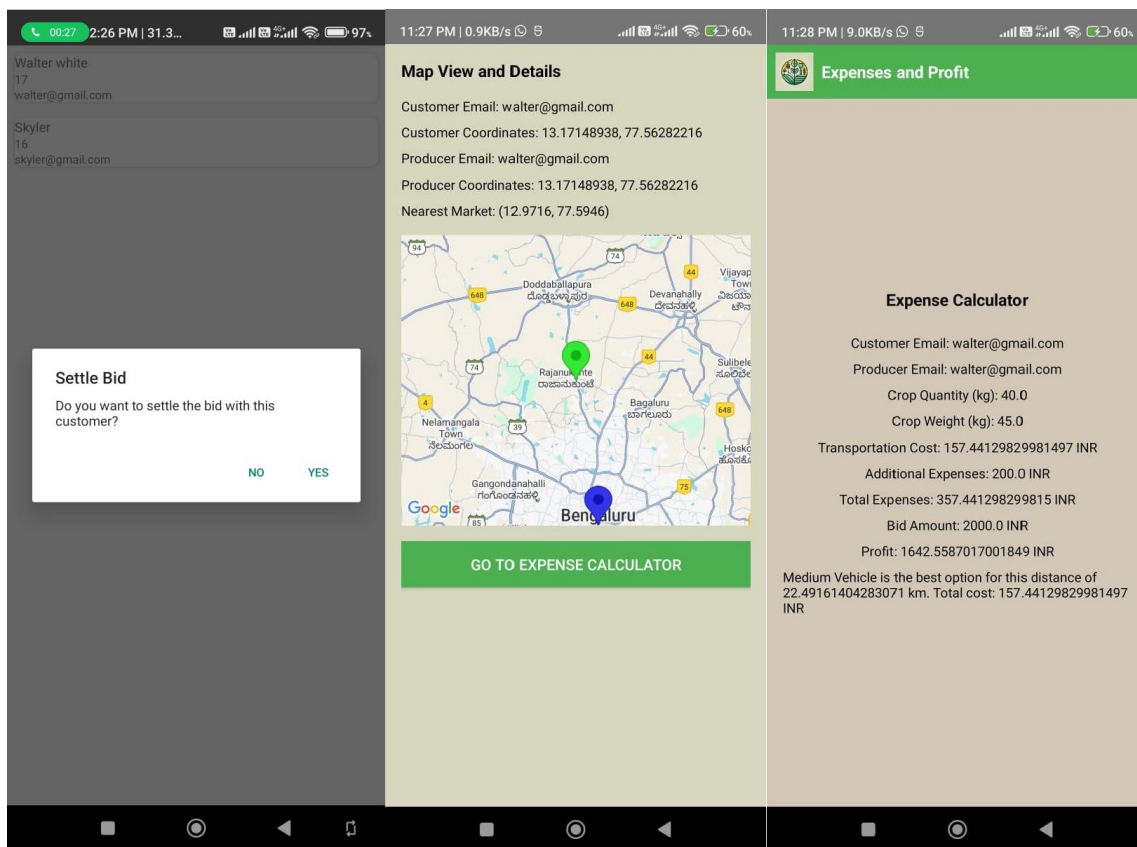


Fig 9.9 Bid Settlement

Fig 9.10 Location Access

Fig 9.11 Expense Calculator

Discussion:

Farmers can examine customer bids on the bid settlement page and choose the most lucrative one. Farmers can choose to select "Yes" to complete the transaction and settle the bid, or "No" to decline and wait for better bids. To ensure simple navigation and efficient logistics, the location access page offers a visual map that shows the positions of the producer, customer, and mandi, denoted by green, blue, and red, respectively and they can also Calculate Expenses.

CHAPTER - 10

CONCLUSION

To sum up, the Kisan Buddy project has successfully executed a number of essential modules that cater to the vital requirements of farmers and consumers in the agricultural ecosystem. Easy access to the platform is ensured by the user registration and login modules for farmers and consumers, which promote increased user engagement and participation from all stakeholders. By allowing farmers to receive proposals from several purchasers and guaranteeing that they obtain the best price for their products, the bidding system module promotes market openness and competition. By offering real-time data, the location access feature optimizes the movement of items, assisting in the reduction of delivery times and logistical expenses. This enhances the supply chain's overall efficiency in addition to helping farmers. In order to help farmers make data-driven decisions and increase their profit margins from sales, the profit maximization module offers insightful information on pricing methods.

Additionally, by removing middlemen and establishing a more direct and transparent marketplace, the crop purchasing and selling capability puts farmers and customers in direct contact. In addition to giving farmers more leverage, this strategy gives customers access to reasonably priced, locally grown goods.

All things considered, these linked modules show how Kisan Buddy may revolutionize the agricultural industry by promoting increased accessibility, efficiency, and transparency. The platform's focus on facilitating streamlining logistics, and increasing profitability demonstrates its contribution to the development of a more interconnected and sustainable agricultural economy. With its main elements, Kisan Buddy has established a solid basis, and as the project develops further, new features will increase efficiency and help farmers even more. Kisan Buddy is positioned to become a vital tool for empowering farmers, increasing production, and promoting a more sustainable and transparent agricultural ecosystem by incorporating cutting-edge technologies and consistently enhancing the app's features.

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APPENDIX-A

PSEUDOCODE

- **The SplashActivity pseudocode:**

Launch SplashActivity

THE ONCreate() FUNCTION:

SET the splash screen design as the screen layout.

After three seconds, WAIT for three more seconds.

CREATE a navigation intent to access LoginActivity

START Activity for Login

CLOSE Splash Exercises

- **The login activity's pseudocode:**

Set up the emailEditText, passwordEditText, loginButton, and registerButton as the initial user interface elements.

- Configure Firebase:

Set up FirebaseFirestore and FirebaseAuth.

Attach UI components to views using the onCreate method.

To call loginUser (), set the login button.

Configure registerButton to initiate the registration process.

- loginUser Method:

Obtain password and email inputs.

Display a toast if fields are empty.

Call checkUserTypeAndRedirect () if it is successful.

If unsuccessful, display an error message.

Retrieve the user ID from Firebase using the checkUserTypeAndRedirect method.

Use Firestore to retrieve the user document. To access the Producer Dashboard, select "Producer" as the user type. To access the Consumer Dashboard, select "Consumer" as the user type. Show a toast if no user typed.

- **The registration activity's pseudocode:**

- Initialize the following UI elements:
registerButton, loginButton, userRoleRadioGroup, emailEditText, and passwordEditText.
- onMethod of Creation: Attach UI components to views. To invoke registerUser (), set registerButton. To reroute to Login Activity, set the login button.
- registerUser Method: Retrieve the chosen role, email address, and password from inputs. Display a toast and close if any fields are left blank or no role is chosen. Make use of FirebaseAuth, to create a user, use createUserWithEmailAndPassword(). If it works, obtain the user ID from FirebaseAuth. Make a user object with a role and email. Under the user's collection, save the user object to Firestore. Display a successful message and reroute to the Login Activity page. If unsuccessful, display an error message.
- User Class: Stores userType and email information for Firestore storage.

- **ProducerDashboard pseudocode:**

- Initialize Components: Attach CropAdapter and configure RecyclerView.
- Get the current user email from FirebaseAuth and initialize Firestore.
- To retrieve crops for a producer, query the Firestore crops collection where producerEmail corresponds to the user's email address.
- Upon success, update crop list with the retrieved data and clear it.
- Notify cropAdapter to update the user interface.
- When it fails, display the error message using Toast.
- Configure Navigation: Use the helper method to configure BottomNavigationView.

- **ConsumerDashboard pseudocode:**

- Initialize Components: Configure CropAdapter to display crops in RecyclerView.
- Set up Firestore to communicate with databases.
- Set up BottomNavigationView by employing the assistance tool.
- Get Every Crop: To obtain all crop data, query the Firestore crops collection.
- Upon successful completion, clear the current crop list and add the retrieved data to it.

- **CropDetails pseudocode:**

- To represent a crop with information such as name, amount, price, and image URL, define CropDetails in the class definition.
- Qualities:
 - String cropName: The crop's name.
 - String quantity: The crop's amount.
 - String price: The crop's price.
 - String cropImageUrl: The image URL of the crop.
- Constructor by default:
 - It is necessary for the deserialization of Firestore.
 - The parameterized constructor accepts the crop name, quantity, price, and picture URL for initialization.
- Getter and Setter Methods: Make the crop's characteristics accessible and modifiable. The functions getCropName() and setCropName(), getQuantity() and setQuantity(), getPrice() and setPrice(), and getCropImageUrl() and setCropImageUrl().

- **Profile activity pseudocode:**

Start ProfileActivity;

initialize FirebaseAuth (mAuth);

initialize FirebaseFirestore (db); and initialize views (emailTextView, userTypeTextView, nameEditText, ageEditText, genderEditText, aadharEditText, saveButton).

To obtain and show user info, use fetchUserData ().

To saveUserData (), set the saveButton onClickListener.

The fetchUserData function:

- Retrieve the user ID from FirebaseAuth.
- Use the user ID to retrieve the user document from Firestore.
- If data is present: Show user type and email.
- Show and turn off editing for the current Aadhar, age, gender, and name.
- If there is no data: Allow name, age, gender, and Aadhar editing.

- The saveUserData function retrieves entered data (name, age, gender, and Aadhar) and displays an error if any field is empty.
- Update user information in Firestore. Disable editing and display a success message upon successful completion.
- When it fails, display an error message.
- Final Profile Action

- **Pseudocode for SellActivity Class:**

- Begin SellActivity: Set up UI components (text fields for crop details, save button.
- Create a Firestore database connection and configure bottom navigation.
- Implement save button Click handler: Execute saveCropDetails function.
- Define saveCropDetails function: Retrieve crop information from input fields, and verify all fields contain data, if any field is empty: Display the "Please fill in all fields" message, Exit function.
- Obtain the producer's email from authentication If a producer is logged in: Generate a new Crop object with the provided details, Store the Crop object in the Firestore "crops" collection.
- Upon successful storage: Show the "Crop listed successfully" notification, Close activity and return to Producer Dashboard. If storage fails: Display the "Failed to list crop" message.
- If no user session exists: Show "No user is logged in" notification, End SellActivity

- **Pseudocode for BiddingActivity:**

- Begin BiddingActivity: Initialize Firestore and FirebaseAuth. Set up UI elements (text views for crop info, input fields for bids).
- Retrieve cropId from Intent and use it to fetch crop information. Configure start bidding button to trigger placeBid function.
- Define fetchCropDetails function: Retrieve crop document from Firestore using cropId. If successful, transform document to Crop object and invoke updateUI to show crop details. If unsuccessful, display error message.
- Define updateUI function: Present crop information (name, price, quantity). Invoke

fetchTopBidders to retrieve top 3 bidders for the crop.

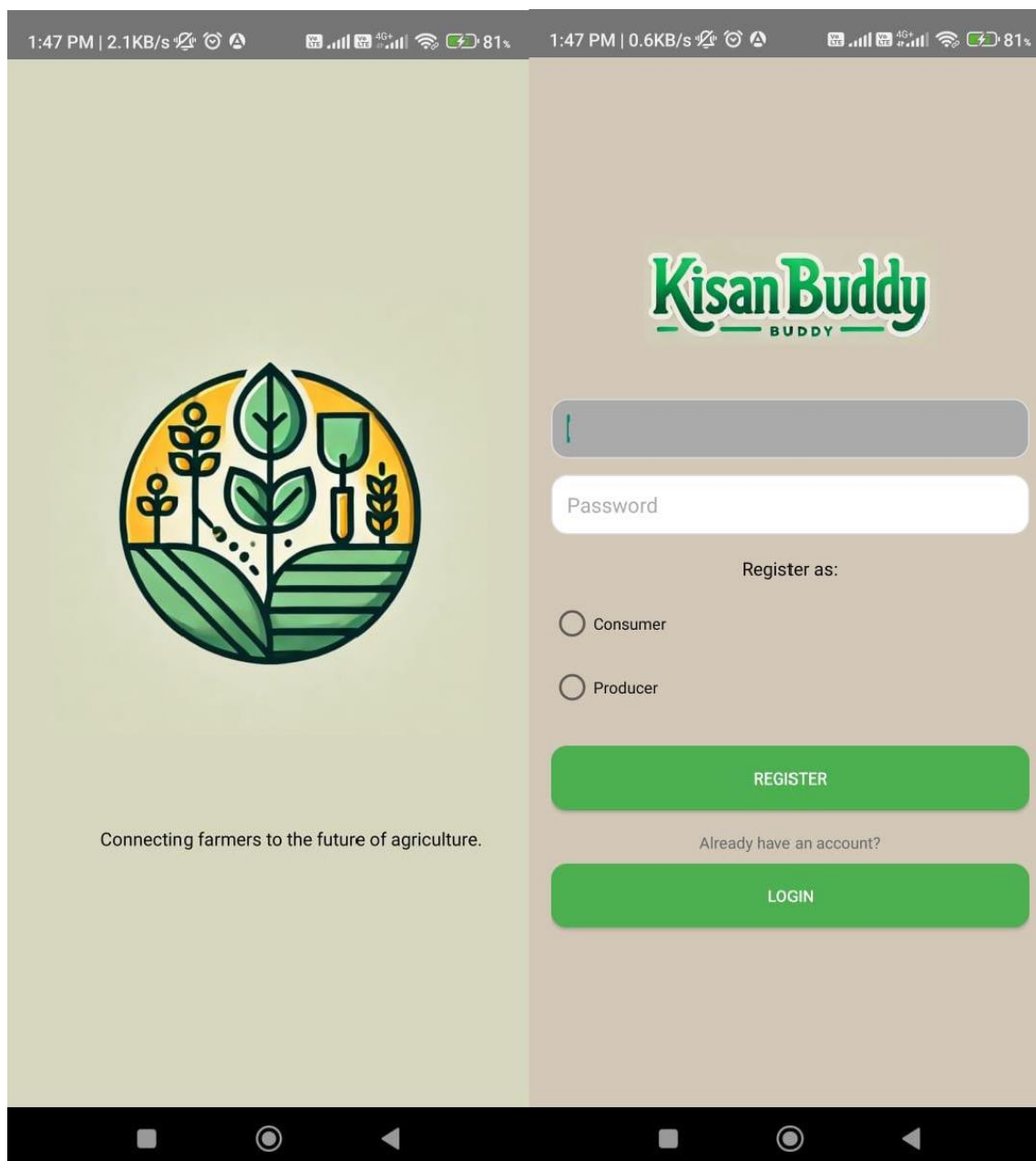
- Define fetchTopBidders function: Obtain top 3 bidders from Firestore (ordered by bid amount).
- Display top 3 bidders' prices in the interface.
- Define placeBid function: Get bid amount from user input. If user is authenticated, retrieve user information from Firestore. Create new Bidder object with user details and bid amount. Add new bid to Firestore under the crop's bidder's collection. If bid is added successfully, show success message and update top bidders. If bid fails, display error message. End BiddingActivity

- **Pseudocode for Mandi Class:**


- Begin Mandi Class
- Declare private variables: latitude (double type). Longitude (double type).
- Create latitude accessor method: Return latitude value.
- Create longitude accessor method: Return longitude value.
- End Mandi Class


APPENDIX – B

SCREENSHOTS



1:47 PM | 1.9KB/s | 4G+ | 81% | 11:06 PM | 7.8KB/s | 4G+ | 93%

 **Profile**



Email: walter@gmail.com

User Type: Producer

Walter white

50

Male

121212121212

Email


Password

LOGIN

REGISTER

Profile Home Sell

32:04 5:32 PM | 0.3K...

Page Name

Crop Name

Enter crop name

Crop Quantity (kg)

Enter crop quantity

Crop Weight (kg)

Enter crop weight

Price per kg

Enter price per kg


SAVE CROP

Profile

Home

Sell

31:28 5:32 PM | 7.1K...

Producer Dashboard

Onion small
Price: \$17
Seller: walter@gmail.com
Bids: 0

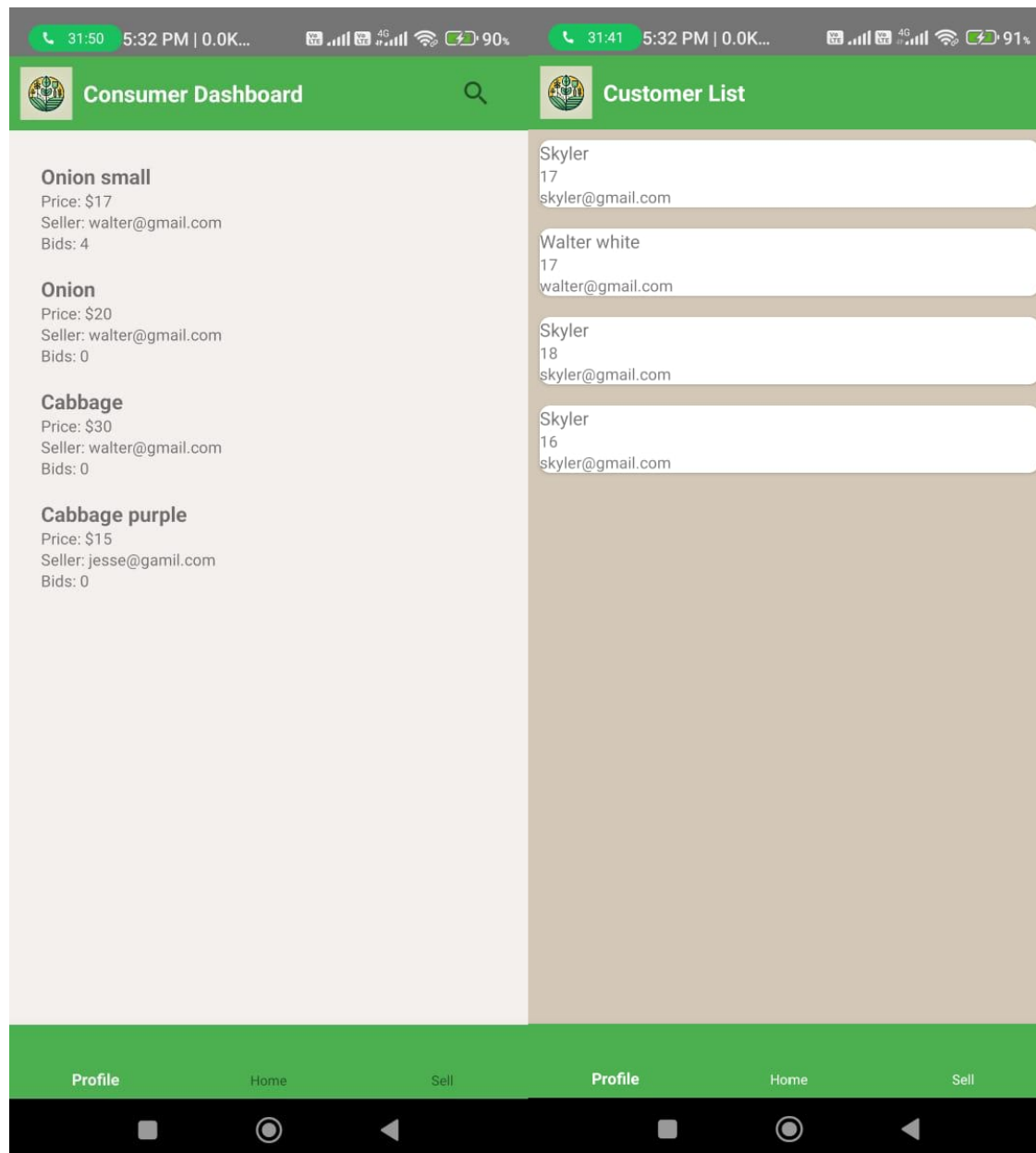
Onion
Price: \$20
Seller: walter@gmail.com
Bids: 0

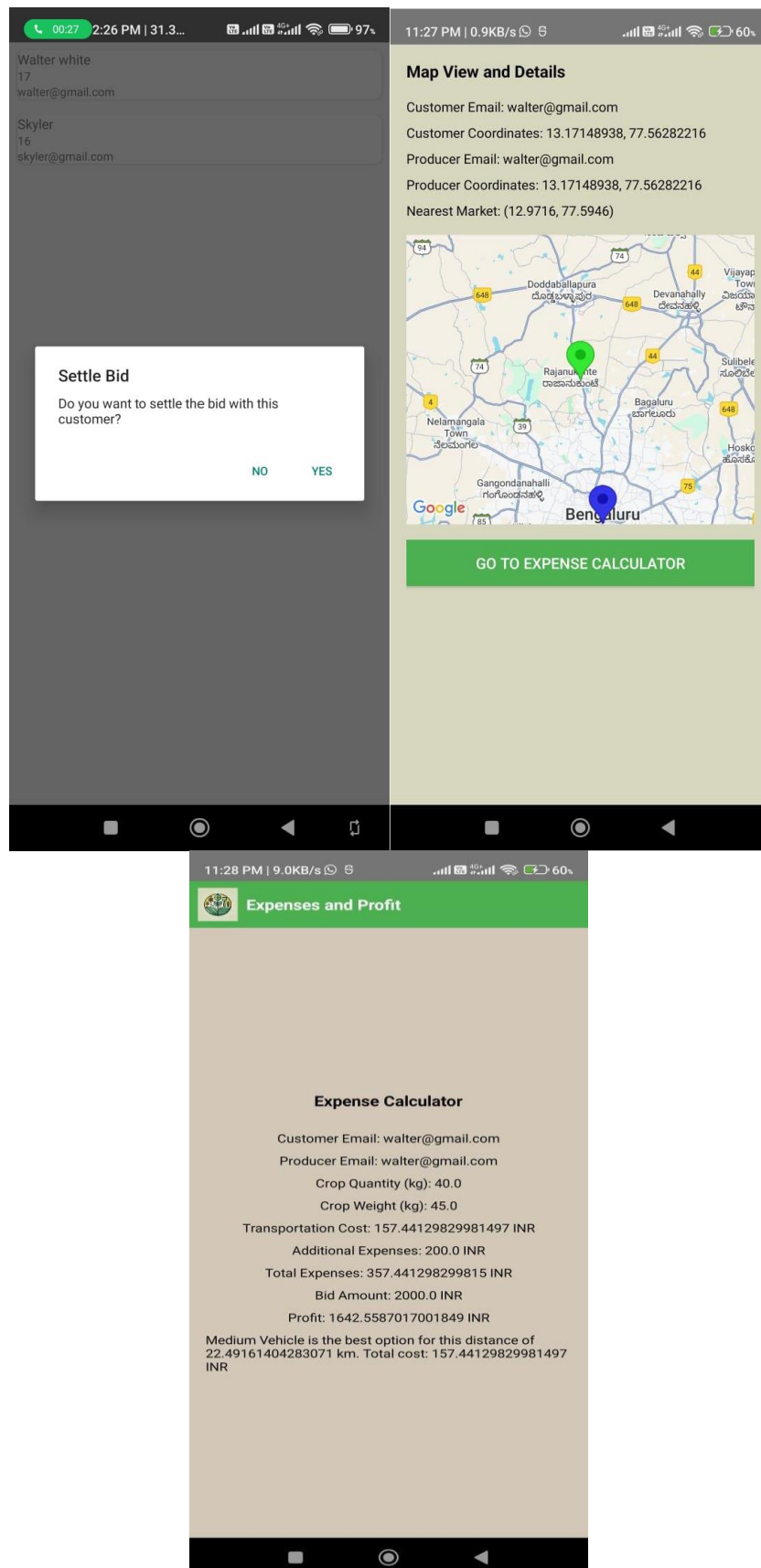
Cabbage
Price: \$30
Seller: walter@gmail.com
Bids: 0

Profile

Home

Sell





APPENDIX – C

ENCLOSURES

GitHub Link: [Click here!](#)

SDG mapping:



The project undertaken aligns with SDG-1, SDG-8, and SDG-10.

- **SDG 1: No Poverty**

- Effect: "Kisan Buddy" contributes to poverty reduction by boosting farmers' earnings.
- Method: The application enables farmers to secure better prices for their produce by offering a direct marketplace, removing middlemen, and enhancing pricing and logistics. This leads to improved financial conditions for farmers and diminishes rural poverty.

- **SDG 8: Decent Work and Economic Growth**

- Effect: The application fosters economic development and generates new job prospects in rural regions.
- Method: By expanding farmers' access to consumers and simplifying crop sales, the app aids rural farmers in achieving economic success. It also promotes the expansion of local transportation services and related agricultural sectors, creating quality employment opportunities within these communities.

- **SDG 10: Reduced Inequality**

- Effect: "Kisan Buddy" helps narrow the gap between large-scale and small-scale farmers.
- Method: The application provides all farmers, regardless of their size or location, equal access to the marketplace, fair pricing, and essential tools for economic improvement. This approach reduces disparities between larger and smaller agricultural producers, promoting more inclusive opportunities for rural farmers.

These alignments highlight the project's focus on alleviating poverty, encouraging rural economic growth, and promoting equal opportunities for all farmers, which are key objectives of the "Kisan Buddy" initiative.

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