KISSAN BUDDY

A PROJECT REPORT

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Under the guidance of,

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Associate Professor
in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING.
(BLOCK CHAIN)

At

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY

BENGALURU

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PRESIDENCY UNIVERSITY

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the Project report **"KISSAN BUDDY"** being submitted by "KV ACHYUTH REDDY, LOCHAN S , SHRUSTHI, EDIGA PURUSHOTHAM GOUD" bearing roll numbers "20211CBC0044, 20211CBC0055, 20211CBC0052, 20211CBC0001" in partial fulfillment of the requirement for the award of the degree of **Bachelor of Technology in Computer Science and Engineering(BLOCK CHAIN)** is a bonafide work carried out under my supervision.

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DECLARATION

We hereby declare that the work, which is being presented in the project report entitled "**KISSAN BUDDY"** in partial fulfillment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering (Block Chain)**, is a record of our own investigations carried under the guidance of **Dr.M.SWAPNA,Associate Professor, School of Computer Science Engineering , Presidency University, Bengaluru.**

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

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ABSTRACT

The proposed project aims to develop an Android-based mobile application designed to assist farmers in optimizing the sale of their produce. The application allows farmers to input key information such as their geographical location, the crops they produce, and their corresponding market prices. Utilizing Google Maps API and Firebase as the backend, the app then calculates and identifies the nearest mandi (market) where the farmer can sell their produce.

In addition to providing location-based mandi recommendations, the app provides a comprehensive cost breakdown for every transaction, considering factors such as transportation and commission fees. The key feature of the application is its ability to compare costs for different markets and recommend the least expensive transaction, thus helping farmers maximize their profits.

This project aims to provide farmers with instant data powered insights to optimize their decision-making in the agricultural supply chain. The use of Firebase as the backend ensures efficient real-time data management, while Google Maps enables seamless location-based services, making the app an indispensable tool for farmers seeking to optimize their sales process.

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We thank our family and friends for the strong support and inspiration they have provided us in bringing out this project.

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INTRODUCTION

Introduction

Agriculture plays a central role in the global economy, serving as a primary source of food, raw materials, and employment for millions of people. However, despite its importance, the agricultural sector faces a number of challenges, especially in the context of modern supply chains. One of the most critical challenges faced by farmers is the difficulty in accessing fair and competitive markets (known as mandis in India and other South Asian regions) to sell their produce. As a result, farmers often find themselves in a disadvantaged position, unable to fully capitalize on their crops' value, and they are frequently forced to accept lower prices for their produce due to a lack of better market access.

The agricultural market landscape is characterized by various obstacles such as geographical barriers, insufficient market transparency, and high transaction costs. For instance, farmers may need to transport their produce over long distances, often without knowledge of the most cost-effective route or the pricing at different mandis. Additionally, the commission charges levied by market intermediaries, as well as the fluctuating prices at various mandis, often create uncertainty and reduce the farmers' overall profitability. This situation is compounded by the absence of a centralized platform that provides clear, real-time information about market prices, transportation costs, and other vital factors.

To address these issues, the proposed project aims to develop a mobile application specifically designed for Android devices. This application will empower farmers by providing them with a simple yet powerful platform to optimize the sale of their agricultural produce. By leveraging modern technologies like Google Maps and Firebase, the application will help farmers navigate the complexities of market access, enabling them to make more informed and cost-effective decisions. The app's primary focus is to estimate the nearest mandi for each farmer based on their location, the crops they produce, and the associated costs involved in reaching the mandi. Furthermore, it will enable farmers to compare transaction costs, including transportation expenses and mandi commissions, to choose the most profitable market.

Farmers across the world face several challenges in navigating the agricultural marketplace, particularly when it comes to finding fair prices for their crops. Some of the primary issues include:

Geographical Barriers: In many rural areas, farmers may be located far from major mandis, requiring them to travel long distances to access these markets. This not only increases transportation costs but also contributes to inefficiencies in the supply chain.

Lack of Market Transparency: Farmers often lack access to real-time information about market prices, resulting in uncertainty about the true value of their crops. This lack of information can cause farmers to sell their produce at a loss or at suboptimal prices.

High Transaction Costs: The process of selling agricultural produce often involves multiple intermediaries, each taking a commission from the sale. These commissions, along with transportation expenses, can significantly reduce the profit margins for farmers.

Limited Market Access: Farmers may not always have access to nearby markets where their crops are in high demand. Even when such markets exist, farmers may not be aware of them, which leads to missed opportunities for maximizing income.

These challenges not only lead to financial losses for farmers but also contribute to the overall inefficiency of the agricultural supply chain. This, in turn, affects the affordability and availability of food, which can have far-reaching consequences for both local and global economies.

Project Objective

The goal of this project is to design and develop a mobile application that helps farmers access the most optimal markets for their produce. The app will leverage location-based services, real-time market data, and cost analysis tools to provide farmers with an easy-to-use platform for improving their decision-making process.

Key objectives of the mobile application include:

Location-Based Market Recommendations: The app will use Google Maps to identify the farmer's location and suggest the nearest mandis where they can sell their crops. This will allow farmers to minimize the distance they need to travel and reduce transportation costs.

Cost Comparison Tools: The app will include a feature that enables farmers to input their crop type, production costs, and transportation expenses. Based on this data, the app will provide a comparison of potential mandis, taking into account various costs (such as transportation and mandi commissions). This will allow farmers to select the mandi that offers the best net profit.

Real-Time Data: The use of Firebase as the backend will ensure that the application has access to real-time data, such as mandi prices, market demand, and transportation costs. This feature will empower farmers with up-to-date information, helping them to make better decisions regarding the sale of their crops.

User-Friendly Interface: The app will be designed with simplicity and ease of use in mind, ensuring that even farmers with limited technical knowledge can effectively navigate the platform and benefit from its features.

Enhanced Transparency: By providing clear and accessible information about market prices, transportation costs, and mandi commissions, the app will increase transparency in the agricultural supply chain. This will enable farmers to negotiate better deals with intermediaries and ensure they receive a fair price for their produce.

Technical Overview

The mobile application will be built for Android devices, using a combination of Google Maps and Firebase to offer key features. Below is an outline of the key technologies and components that will be used:

Google Maps API: This will be used to determine the location of the farmer and provide directions to nearby mandis. The Google Maps API will also allow farmers to visualize the distances to various mandis, which will be a critical factor in making cost-effective decisions.

Firebase: Firebase will be used as the backend to manage real-time data storage and retrieval. It will securely store data related to crop types, mandi prices, transportation costs, and user profiles. Firebase's real-time database features will allow the app to provide up-to-the-minute information, ensuring that farmers have access to the latest market trends and pricing data.

Cost Calculation Algorithms: The app will feature algorithms designed to estimate transportation costs, calculate mandi commissions, and compare the net profitability of different mandis. These algorithms will take into account various factors such as fuel prices, transportation distance, and local mandi regulations.

User Interface (UI) and User Experience (UX): The application will be designed to be intuitive and user-friendly, allowing farmers to easily input data (such as crop type and location) and receive relevant results. The UI will be simple and accessible, with large buttons and easy-to-read fonts that are suitable for use by individuals with varying levels of technological proficiency.

Benefits of the Project

The proposed application offers a wide range of benefits for farmers, the agricultural sector, and the wider economy:

Increased Farmer Profitability: By reducing transportation costs, mandi commissions, and providing better market access, the app will help farmers maximize their profits. By selecting the mandi with the lowest overall transaction cost, farmers can secure a better income from their crops.

Improved Market Efficiency: The app will streamline the process of connecting farmers with markets, reducing the time and resources spent searching for the best mandi. This will help create a more efficient supply chain, benefiting both farmers and consumers.

Empowerment through Information: With access to real-time data and cost comparison tools, farmers will be able to make more informed decisions, reducing uncertainty and providing greater control over their business. This empowerment can help farmers achieve financial independence and build sustainable agricultural practices.

Enhanced Transparency and Fairness: The app will increase transparency by providing clear, up-to-date pricing information. Farmers will no longer be at the mercy of intermediaries or opaque market conditions. This can foster a fairer agricultural marketplace where both farmers and consumers benefit.

Scalable Model: The project can be scaled to different regions and markets, with the ability to accommodate various crop types, transportation modes, and mandi structures. Over time, the app can be expanded to include more features, such as weather forecasts or crop health monitoring, to further assist farmers in managing their businesses.

CHAPTER-2

LITERATURE SURVEY

The literature survey section explores existing research and developments related to mobile technology in agriculture, market accessibility, and cost optimization for farmers. By reviewing these studies, we can better understand the limitations of current methods and identify opportunities for improving farmers' connectivity to markets through mobile applications, GIS technology, and cloud-based platforms. This survey forms the foundation for the proposed app's development, ensuring it addresses key challenges faced by farmers today.

Brief explanation of each paper mentioned

Poonia et al. (2020): This study explores how mobile platforms can be used to improve market access for farmers by providing real-time pricing and market linkage. It helps farmers make informed decisions about where to sell their produce. However, it does not include a feature for transaction cost analysis, which would be beneficial for evaluating net profitability.

Patel et al. (2021): This paper discusses the integration of Google Maps in agriculture to help farmers locate mandis and other agricultural resources. It aims to reduce the stress of navigating rural areas and finding the right mandi. However, it does not focus on optimizing market prices or including transaction cost analysis, which could enhance the decision-making process.

Mishra et al. (2019): This research analyzes the impact of transaction costs in agricultural sales, emphasizing the need to estimate these costs for improved profitability. The study highlights the importance of cost estimation but lacks tools for real-time price discovery or the ability to locate mandis, which limits its practical application.

eNAM (National Agriculture Market): eNAM is an electronic trading platform that provides real-time pricing and allows farmers to participate in online auctions, promoting transparency in the pricing of agricultural goods. While it connects farmers to traders across India, it lacks location-based mandi features and poses usability challenges for farmers with low tech literacy.

Kisan Suvidha App: This app provides farmers with essential services like weather updates, market prices, expert advice, and government subsidy information. While it offers useful market data, it is focused on general agricultural advice and does not include tools for transaction cost estimation or suggestions for the best mandi locations.

AgriBazaar: AgriBazaar is an online marketplace that connects farmers directly with buyers, traders, and agri-businesses, facilitating direct negotiation and reducing reliance on intermediaries. However, it requires farmers to manually assess which mandi is the best option and lacks location-based features, making it less convenient for farmers looking for nearby markets.

AgriApp: This app provides advice on agricultural inputs, crop protection, and irrigation management. It helps improve crop productivity by connecting farmers with suppliers and offering actionable advice. However, it does not offer market price data or facilitate the sale of produce, limiting its role in market access.

FarmLogs: FarmLogs is a crop management platform that offers data on weather, crop performance, and input use, providing detailed insights to optimize farming practices and improve productivity. However, it lacks market connectivity and tools for cost optimization, meaning it doesn't address sales or transaction costs.

CropIn: CropIn is a cloud-based platform for precision farming that uses satellite data and weather patterns to provide AI-driven insights to optimize farming practices and post-harvest operations. While it enhances farming operations, it does not provide market data or tools for mandi price comparison.

AgroStar: AgroStar offers agricultural solutions, including input sourcing and crop management advice, with location-based services connecting farmers to nearby agri-input suppliers. While it helps improve farming operations, it does not include market price discovery or cost estimation tools, limiting its support for sales optimization.

Farmers Friend: Farmers Friend uses GPS to provide location-based services such as equipment rental, pesticide spraying, and access to input suppliers. This app helps farmers in remote areas access necessary services but does not include mandi location services, price comparison, or transaction cost estimation.

Bharat Krishak Samaj (BKS): This platform provides weather forecasts, crop guidance, market prices, and financial management tools to assist farmers. While it offers useful financial tools and market updates, it lacks features for real-time mandi estimation and transaction cost optimization.

Rural India Online (RIO): RIO offers services like crop insurance, loan applications, financial planning tools, and market price information. While it helps with financial management, loan applications, and insurance, it does not integrate location-based services or transaction cost estimates, limiting its support for market access.

Table summarizing the papers and their key details:

Paper Title	Method	Advantages	Limitations
Poonia et al. (2020)	Use of mobile platforms for market access.	Provides real-time pricing and market linkage, helps farmers make informed decisions.	Lacks integration of transaction cost analysis.
Patel et al. (2021)	Integration of Google Maps in agriculture for locating mandis and agricultural resources	Helps farmers navigate rural areas, reduces stress in finding the right mandi.	Does not focus on market price optimization or cost analysis.
Mishra et al. (2019)	Analysis of transaction costs in agricultural sales.	Highlights the importance of estimating transaction costs for better profitability.	Does not provide a tool for real-time price discovery or mandi location.
eNAM (National Agriculture Market)	Electronic trading platform offering real-time pricing and auction participation.	Facilitates access to transparent pricing, connects farmers to traders across India.	Lacks location-based mandi features, challenges with usability for farmers with low tech literacy.
Kisan Suvidha App	Provides weather updates, market prices, expert advice, and information on subsidies.	Offers essential market data and government notifications.	Focused on general agricultural advice, lacks tools for transaction cost estimation and mandi location suggestions.
AgriBazaar	Online marketplace connecting farmers with buyers, traders, and agri-businesses.	Enables direct negotiation and reduces reliance on intermediaries.	Requires manual assessment of best mandi options, lacks location-based

			solutions.
AgriApp	Provides advice on inputs, crop protection, and irrigation management.	Improves crop productivity by offering actionable advice and connecting farmers with suppliers.	Does not provide market price data or facilitate sales.
FarmLogs	Crop management platform with data on weather, crop performance, and input use.	Provides detailed insights to optimize farming practices and improve productivity.	Lacks market connectivity and tools for cost optimization.
CropIn	Cloud-based platform for precision farming, offering satellite data and weather patterns.	Uses AI-based insights to improve farming practices and optimize post-harvest operations.	Focuses on farming operations, lacks market data and mandi price comparison tools.
AgroStar	Provides agricultural solutions, including input sourcing and crop management advice, with location-based services.	Connects farmers with nearby agri-input suppliers and offers a wide range of farming solutions.	Lacks market price discovery or cost estimation tools.
Farmers Friend	Uses GPS to provide location-based services such as equipment rental, pesticide spraying, and input suppliers.	Helps farmers access nearby services, particularly in remote regions.	Does not provide mandi location, price comparison, or transaction cost estimation.
Bharat Krishak Samaj (BKS)	Offers weather forecasts, crop guidance, market prices, and financial management tools.	Provides financial tools and market updates.	Lacks real-time mandi estimation and cost optimization features.
Rural India Online (RIO)	Offers crop insurance, loan applications, and financial planning tools along with market price info.	Helps manage finances, provides loan applications and insurance.	Does not integrate location-based services or transaction cost estimates.

Table 1

CHAPTER-3
RESEARCH GAPS OF EXISTING METHODS

Despite the significant progress in agricultural technologies, there are still several gaps in the existing methods for helping farmers optimize the sale of their produce. These gaps create inefficiencies in the agricultural supply chain and limit the effectiveness of existing solutions. The key research gaps identified in the current methods include:

1.Limited Market Access and Visibility: Existing platforms often fail to provide farmers with a comprehensive view of all potential market options available in their region. Farmers are generally unaware of nearby mandis (markets) and the pricing conditions at those locations. Most current solutions focus on a few selected markets, which limits the farmers' ability to explore the best-selling opportunities.

2.Lack of Real-Time Market Data: Many agricultural applications and platforms do not provide real-time updates on market prices or demand fluctuations. This means farmers might be operating based on outdated information, which could result in them making less profitable decisions when selecting markets or negotiating prices.

3.Absence of Cost Calculation and Optimization: Most existing systems do not factor in the transportation costs, commissions, or other hidden charges associated with selling produce at various mandis. Without these calculations, farmers are unable to compare the full cost of different market options, leading to potential losses. Furthermore, most tools lack an optimization feature that recommends the most cost-effective market based on the farmer's location and crop type.

4.Geographical Barriers and Poor Localization: Many current systems are not well-integrated with location-based services, such as Google Maps, which would help farmers navigate easily to nearby mandis. Additionally, the lack of proper localization means that many solutions are not tailored to the specific needs and conditions of rural or remote areas where farmers often reside. The result is a gap in accessibility and convenience for farmers in less- developed regions.

5.Limited Support for Small and Marginal Farmers: Existing agricultural technology often focuses on larger, commercial-scale farmers, neglecting the needs of smallholder or marginal

farmers who constitute a significant portion of the agricultural workforce. These farmers often face more challenges in terms of access to markets, fair prices, and information about transportation and logistical support.There is a lack of tools designed to specifically address their unique needs and constraints.

6.Inefficient Data Management and User Experience: Many agricultural platforms either fail to securely manage large-scale data or suffer from a poor user interface that makes it difficult for farmers to access and use the system effectively. For instance, some applications may not provide a seamless experience for farmers who are not tech-savvy, leading to difficulties in understanding or using the platform. Furthermore, backend data management is often cumbersome, and the real-time data required for accurate price and cost estimates is not effectively supported.

7.Lack of Integration with Government and Mandi Systems: In many regions, mandis (markets) are regulated by government bodies, and their price listings and transaction methods are often not digitized or standardized. Existing solutions may fail to integrate with these government systems, leading to discrepancies in the information available to farmers. therefore, farmers may struggle to obtain the most reliable and current market data or may be restricted from participating in digital systems due to lack of interoperability with traditional mandi operations.

8.Absence of End-to-End Transaction Transparency: Current systems often do not provide a complete, transparent transaction trail. Farmers may struggle to obtain clear, detailed information on how their money is being spent throughout the transaction process, from market fees to transportation costs. This lack of transparency increases trust issues between farmers and marketplaces, further limiting the adoption of digital platforms for agricultural sales.

CHAPTER-4

OBJECTIVES

1. **Develop a User-Friendly Mobile Application for Farmers:**

   To create an easy-to-use Android mobile application that allows farmers to input their location, crop type, quantity, and price in a simple and intuitive interface. To ensure the app is accessible to farmers with varying levels of digital literacy, making it easy for them to navigate through the system and access relevant information.

2. **Provide Location-Based Market Recommendations:**

   To integrate Google Maps API to display the nearest mandis (markets) based on the farmer's current location. To provide farmers with a list of mandis that are closest to them, making it easier to access nearby markets for selling their produce.

3. **Estimate Transaction Costs:**

   To develop a system that estimates all potential costs associated with selling produce at different mandis, including transportation expenses, mandi commission fees, and other hidden costs. To provide farmers with a breakdown of transaction costs for each mandi option to enable better financial planning.

4. **Optimize Market Selection Based on Cost Efficiency:**

   To implement an optimization feature that compares the total costs for different mandis (including transportation and commission) and recommends the least expensive option for the farmer.To help farmers maximize their income by selecting the most cost-effective mandi based on their specific needs.

5. **Offer Real-Time Data and Updates:**

   To ensure the app uses real-time data from Firebase for mandi prices, transportation costs, and other dynamic market factors, providing up-to-date information to farmers. To enable quick updates and notifications on changes in pricing or market conditions that may affect the farmer's decision-making.

6. **Enable Secure Data Management:**

   To use Firebase as a backend to securely store user data, crop details, mandi information, and transaction histories, ensuring the privacy and security of farmer data.To provide farmers with a personalized experience based on their historical data and preferences.

7. **Improve Decision-Making for Farmers:**

   To equip farmers with the tools and information needed to make informed decisions on where to sell their crops, reducing uncertainty and increasing profitability.To empower farmers by providing transparency in market transactions and helping them navigate the complexities of pricing and costs at various mandis.

8. **Enhance Market Transparency and Access:**

   To bridge the information gap between farmers and mandis by providing a transparent view of market prices, costs, and geographical information.To help farmers find fair and competitive market opportunities, especially for smallholder farmers who often face difficulties in accessing the best prices due to limited market knowledge.

9. **Provide a Scalable and Sustainable Solution:**

   To design the app to be scalable, ensuring it can accommodate more mandis, crop types, and geographical locations as the user base grows.To establish a sustainable platform that can be continuously updated with new features, market data, and government schemes to keep the app relevant and useful over time.

10. **Improve Agricultural Market Efficiency:**

    To contribute to the overall efficiency of the agricultural supply chain by reducing inefficiencies in market access and improving the pricing mechanism through data-driven decisions.To support the development of a more equitable and transparent agricultural marketplace by leveraging technology to streamline the transaction process.

CHAPTER-5

PROPOSED METHODOLOGY

The proposed methodology for developing the mobile application involves a systematic approach that includes requirements gathering, design, development, and testing phases. Each phase ensures that the app meets the needs of farmers, optimizing their market access and transaction costs through seamless integration of location-based services, real-time data, and cost estimations. Below is the detailed methodology for the project:

5.1 Requirement Analysis and Design

5.1.1 User Research and Requirement Gathering:

The first step is to gather requirements by understanding the specific challenges farmers face in accessing markets and the costs associated with selling their produce. Interviews, surveys, and field visits can be conducted to collect information about farmer needs, preferred crops, geographical locations, and transaction challenges.

5.1.2 Market and Mandi Data Collection:

Data on the available mandis, their locations, pricing conditions, transportation costs, and commissions are collected through public sources, government data, and partnerships with mandi associations. This data is critical for accurate cost estimations.

5.1.3 System Architecture Design:

The app architecture will be designed with a focus on scalability and performance. Firebase will be used as the backend for secure real-time data storage and management, while Google Maps API will be integrated for location- based services and navigation features.

5.1.4 User Interface (UI) Design:

The user interface will be designed to be simple, intuitive, and accessible for farmers with varying levels of digital literacy. The UI will feature input forms for crop details, location, and pricing, as well as result pages that show the nearest mandis and cost estimates.

5.2 Development Phase

5.2.1 Frontend Development (Android App):

The mobile application will be developed using Android Studio using Java/Kotlin programming languages. The frontend will include interactive screens where farmers can input their crop type, quantity, and price. The app will use Google Maps to display the closest mandis based on the farmer's location.Real-time user input will trigger requests to the backend to calculate the most optimal mandi options.

5.2.2 Backend Development (Firebase):

Firebase will be used for data management and real-time synchronization. The backend will store mandi details, farmer profiles, crop data, and transaction information. Firebase Cloud Firestore will be used for storing structured data, while Firebase Authentication will handle secure user authentication.APIs will be developed to calculate transportation costs, mandi commission rates, and generate cost estimates based on the farmer’s location, crop type, and quantity.

5.2.3 Location-Based Services:

Google Maps API going be integrated to fetch the farmer’s current location and display nearby mandis on the map. The app will calculate the distance between the farmer’s location and various mandis to suggest the most convenient options.Location tracking will be essential for real-time updates on mandi availability and any changes in pricing or distance.

5.3 Cost Estimation and Optimization Logic

5.3.1 Cost Estimation Algorithm:

The app will incorporate algorithms to calculate the total cost for each transaction, including factors such as transportation costs (distance from farmer's location to mandi), mandi commission, and any additional fees.The system will allow farmers to input various crops and their respective prices and calculate the potential income after accounting for transaction costs.

5.3.2 Optimization Algorithm:
The optimization feature will compare the total cost (including all expenses) for different mandis and recommend the least expensive transaction. This recommendation will be based on the shortest distance, lowest commission rate, and overall cost efficiency.

5.3.3 Comparison and Recommendation: The app will present a list of mandis in order of least to most expensive, showing a detailed breakdown of costs for each market option to help the farmer make an informed decision.

5.4 Testing and Validation

5.4.1 Functional Testing: After development, the application will undergo functional testing to ensure all features work as expected. This includes testing the user input screens, map integration, cost estimation logic, and real-time data updates.

5.4.2 Usability Testing: Usability testing will be conducted with a group of farmers to ensure that the app is intuitive and user-friendly. Feedback will be collected to improve the design and functionality.

5.4.3 Performance Testing: The app will be tested under various network conditions and load scenarios to ensure it performs efficiently, especially when interacting with real- time data from Firebase and Google Maps.

5.4.4 Accuracy of Cost Estimation: The cost estimation and optimization features will be validated by comparing the app's calculations with actual market data and farmer experiences.

5.5 Deployment and Maintenance

5.5.1 App Deployment: Once the application has been thoroughly tested, it will be deployed to the Google Play Store. Detailed user guides and support documentation will be provided to help farmers get started with the app.

5.5.2 Continuous Monitoring: The app will be monitored for performance, bugs, and any issues that users encounter. Regular updates will be made to improve functionality, incorporate user feedback, and expand mandi data coverage.

5.5.3 Maintenance and Support: The system will be maintained by regularly updating the backend data, including mandi prices and location details. Support will be provided to farmers for troubleshooting, data updates, and learning how to use the app effectively.

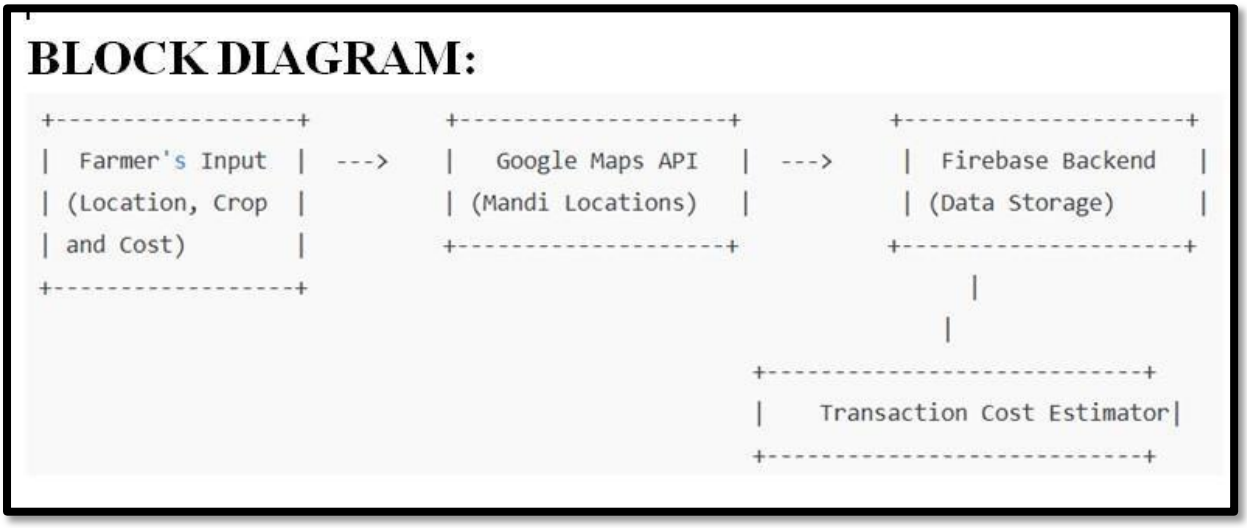

Figure 1.1

This diagram illustrates the high-level architecture of the application, showcasing the different components and their interactions.

Key Components:

Farmer's Input: This is where the farmer interacts with the app. They input their location, the type of crop they are selling, and the estimated cost.

Google Maps API: The app likely utilizes the Google Maps API to determine the locations of nearby mandis. This information is then used to provide relevant options to the farmer.

Firebase Backend: This cloud-based platform serves as the app's backend. It's responsible for storing data like farmer information, mandi locations, and transaction history. This allows for data persistence and easy access.

Transaction Cost Estimator: This component is crucial for the app's functionality. It calculates the estimated cost of the transaction, likely considering factors like transportation costs, market fees, and potential losses during transportation.

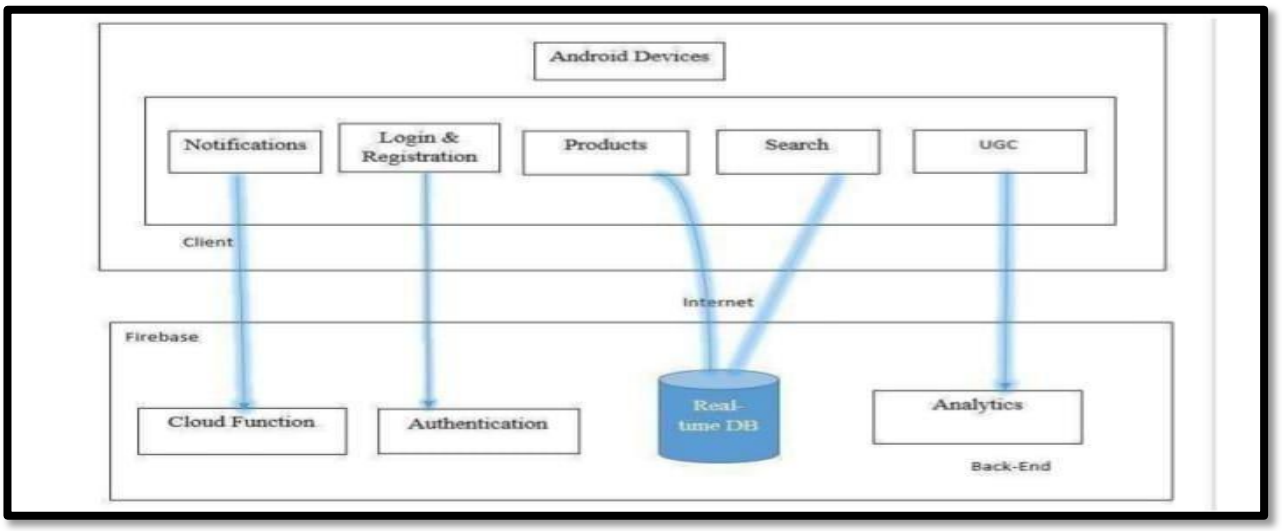

Figure 1.2

This diagram illustrates the high-level architecture of the application, showcasing the different components and their interactions.

Key Components:

Android Devices: This represents the end-user interface, where farmers interact with the Kisan Buddy app on their Android devices.

Client: This encompasses the front-end of the application, responsible for handling user interactions, displaying information, and sending requests to the backend.

Firebase: This serves as the backend infrastructure, providing several key services:

Cloud Functions: These are serverless functions that execute code in response to events triggered by other Firebase services or external sources. They likely handle tasks like sending notifications, processing data, and integrating with other APIs.

Authentication: This service manages user authentication and authorization, ensuring secure access to the application's features.

Firestore: This NoSQL database stores the application's data, such as user profiles, product listings, and transaction records.

Internet: This represents the network connection that enables communication between the client and the backend.

Back-End: This encompasses the server-side logic and data processing. It likely includes:

Other Services: This could include integration with external APIs like Google Maps for location-based services, payment gateways for processing transactions, and other relevant services.

CHAPTER-6

SYSTEM DESIGN & IMPLEMENTATION

The system design and implementation of the proposed mobile application for helping farmers optimize their produce sale involves both the **architectural design** and the **technological implementation** of key features. This section outlines the design principles, components, and workflow, as well as the technologies used to develop and deploy the application.

6.1 System Design

The application follows a Client-Server Architecture with the Android application (client) interacts with the Firebase backend (server). The key components are:

6.1.1 Frontend (Android Application):

User Interface (UI): The Android app serves as the user-facing interface where farmers input their data, view results, and interact with the map and cost estimation tools.

Google Maps Integration: This allows the app to fetch the user's location and display nearby mandis, providing directions and distance calculations.

Data Entry: Farmers input crop details, including type, quantity, and price. The system then computes the transaction costs and provides mandi recommendations.

6.1.2 Backend (Firebase):

Database: Firebase Firestore stores all the data regarding mandis, farmer profiles, crop information, and market prices. This database is used for real- time synchronization between the frontend and the server.

Authentication: Firebase Authentication ensures secure login and user management, allowing farmers to store their data securely and access their profile details.

Cloud Functions: Firebase Cloud Functions can be used to perform backend processing, such as cost calculations, data validation, and optimization algorithms for market recommendations.

Real-time Data Updates: Firebase real-time database features ensure that any updates to mandi data or farmer inputs are immediately reflected in the app.

6.2 Module Design

The system is divided into the following main modules:

6.2.1 User Input Module:

Description: The farmer inputs the following information:

Location: Automatically fetched using GPS or manually entered.

Crop Type and Quantity: Farmers select the type of crop and the quantity they wish to sell.

Price per Unit: The price at which the farmer wishes to sell the produce.

Functionality: This module captures and sends data to the backend (Firebase) for processing.

6.2.2 Market and Mandi Data Module:

Description: This module stores all the information about mandis, including:

Mandi Location: Latitude and longitude coordinates of the mandi.

Pricing Information: Prices for various crops at different mandis.

Commission Rates: Information on commission charges or fees taken by mandis.

Transportation Costs: Estimated transportation costs based on distance from farmer's location to the mandi.

Functionality: This module is primarily stored in Firebase Firestore, and data is updated periodically or in real time as new mandi data becomes available.

6.2.3 Cost Estimation Module:

Description: Once the farmer inputs their data, this module calculates:

Distance: Distance from the farmer's location to each nearby mandi using the Google Maps API**.**

Transportation Cost: Calculated based on the distance.

Mandi Commission: Fees charged by each mandi, if any.

Total Transaction Cost: A sum of transportation costs, mandi commission, and any other associated costs.

Functionality: The module calculates and stores the costs in the backend (Firebase), which is then presented to the user on the front end**.**

6.2.4 Optimization & Recommendation Module:

Description: After calculating the total cost for each mandi, the system compares all available options.

Cost Comparison: The module compares the total transaction costs (including transportation and commission) for each nearby mandi.

Recommendation: The app recommends the mandi with the least total cost to the farmer, ensuring the most cost-effective transaction.

Functionality: The algorithm compares transaction costs in real-time and presents a list of recommended mandis ordered by the least to most expensive.

6.2.5 Map and Navigation Module

Description: Integrated with Google Maps, this module provides:

Mandi Locations on Map: Displays the closest mandis on the map according to the current location of farmers.

Navigation: Directions and estimated travel time to the selected mandi.

Distance Calculation: Distance between farmer's location and each mandi is shown, helping farmers choose the most accessible market.

6.2.6 User Profile and Data Management

Description: The user’s data (location, crop details, transaction history) is stored securely in Firebase.

Profile Management: Farmers can update their profile, crop data, and view past transaction history.

Security: User authenticationis handled via Firebase Authentication, guarenteeing that only verified farmers can access to their data.

Functionality: This data is securely stored and can be used to personalize the user’s experience or help with future transactions.

6.3 Implementation Process

6.3.1 Frontend Implementation (Android):

Development Tool: Android Studio using Kotlin or Java programming language.

Key Libraries and APIs:

Google Maps API: To integrate map and location-based services, showing nearby mandis and offering navigation features.

Firebase SDK: For backend integration, including Firebase Authentication, Firestore, and Firebase Cloud Functions.

Recycler View: To display the list of mandis and their costs in a scrollable, easy-to-read format.

Material Design Components: To create an aesthetically pleasing and user- friendly interface.

6.3.2 Backend Implementation (Firebase):

Firebase Firestore: Used to store mandi data, user profiles, and transaction history.

Firebase Authentication: Ensures secure login and user management.

Firebase Cloud Functions: Implement server-side logic such as cost calculations, cost comparison, and market recommendations.

Cloud Storage: For storing any media files or additional data related to user or mandi profiles.

6.3.3 Data Flow:

Step 1: The farmer inputs their location, crop type, quantity, and price.

Step 2: The app fetches the closest mandis from the Firebase database and calculates transportation costs.

Step 3: The app calculates the total cost for each mandi, considering transportation, mandi commission, and other factors.

Step 4: The app compares all available mandis and provides a list, recommending the least expensive option.

Step 5: The farmer can view the selected mandi on Google Maps, get navigation, and proceed with the transaction.

6.4 Testing and Validation

Unit Testing: Each individual module (e.g., cost calculation, location-based services) is

tested for accuracy and functionality.

Integration Testing: Ensures that the interaction between the frontend and backend works seamlessly, particularly data synchronization between the app and Firebase.

User Acceptance Testing: Farmers test the app in real-world conditions to ensure usability, accuracy, and overall satisfaction.

Performance Testing: Ensures that the app performs well under various conditions, including poor network connectivity and heavy user traffic.

6.5 Deployment

Deployment to Google Play Store: Once the app has been thoroughly tested, it will be deployed to the Google Play Store for farmers to download and use.

Maintenance and Updates: The app will be regularly updated with new features, improved cost estimation algorithms, expanded mandi data, and bug fixes.

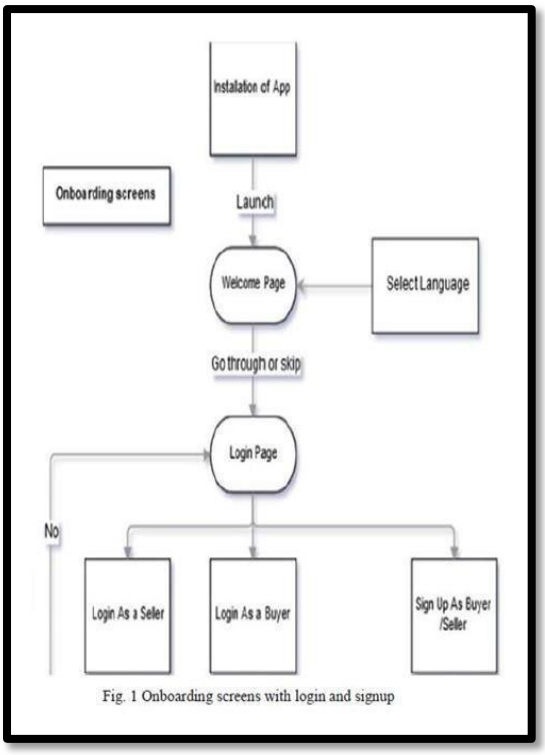

Figure 2.1- Welcome and Login page

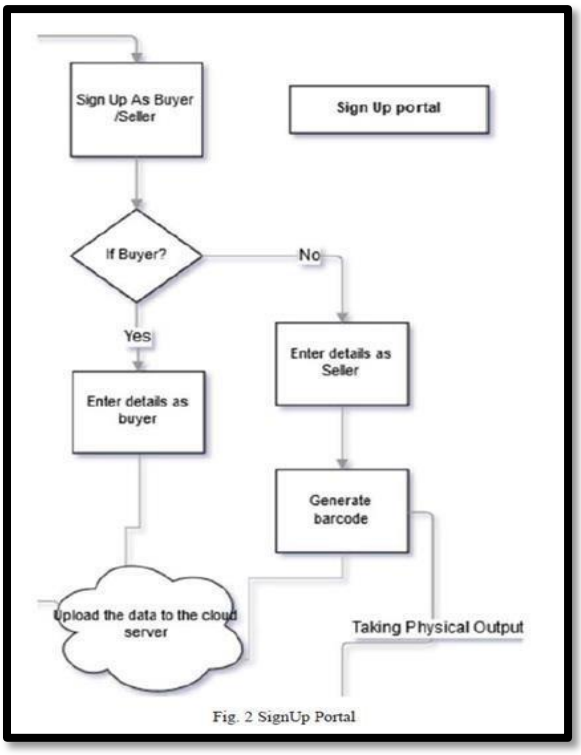

Figure 2.2- SignUp Portal

These two diagrams provides a visual representation of the initial user flow when launching the Kisan Buddy mobile application. Developed using Android Studio with Kotlin and Firebase, the app guides users through a series of steps before they can access its core

functionalities.

App Installation and Launch:

The journey begins with the user installing the Kisan Buddy app from the Google Play Store. Upon launching the app, they are presented with a set of Onboarding Screens. These screens typically introduce the app's core features, its benefits to farmers, and any relevant information to enhance the user experience.

Onboarding Screens and Flexibility:

The app offers flexibility to users by allowing them to either go through the Onboarding Screens to familiarize themselves with the app or skip them if they are already acquainted with its features. This approach caters to different user preferences and saves time for experienced users.

Welcome Page and Language Selection:

After completing or skipping the onboarding, the user is greeted with the Welcome Page. This page often displays a brief welcome message or the app's logo, creating a positive first impression. Following this, the user is prompted to select their preferred language. This step ensures the app displays content in the user's native language, improving usability and accessibility.

Login Page and User Roles:

Finally, the user reaches the Login Page. Here, the app presents three distinct options:

Login as a Seller: This option is intended for farmers or sellers who wish to list their agricultural products on the platform. They can log in using their existing credentials.

Login as a Buyer: This option is for users who are looking to purchase agricultural products. They can log in using their registered accounts.

Sign Up: This option is available for new users who need to create an account to use the app's features. They can choose to sign up as either a seller or a buyer.

Technical Considerations:

The implementation of this user flow involves several technical considerations:

Android Studio and Kotlin: The app's development is carried out using Android Studio, leveraging the Kotlin programming language for its concise and expressive syntax.

Firebase: Firebase plays a crucial role in the app's backend infrastructure. It handles user authentication securely through Firebase Authentication, ensuring the safety of user credentials. Additionally, Firebase Firestore is likely used to store user data, including profiles, product listings, and transaction history.

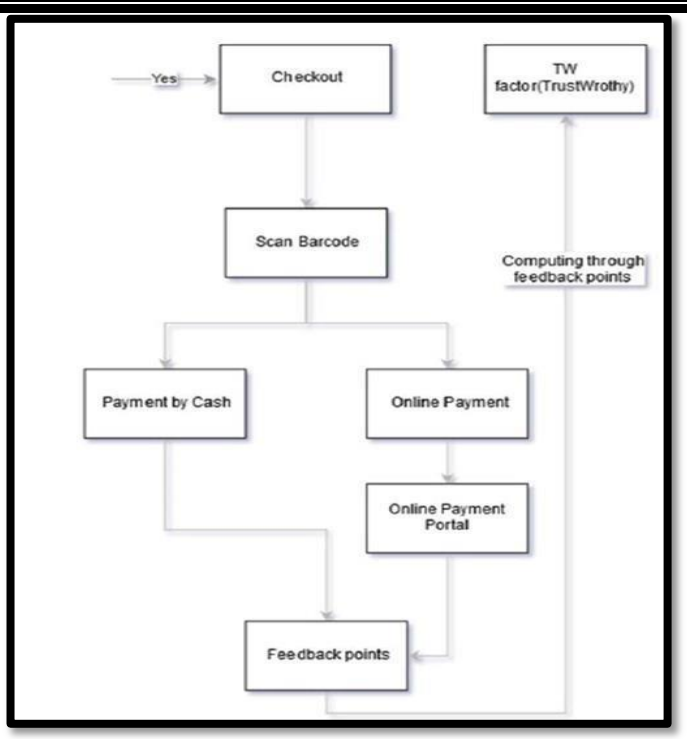

Figure 2.3 – Transaction page

This diagram illustrates the key steps involved in the transaction process within the Kisan Buddy app. It outlines the flow from product selection to payment, highlighting the integration of trust and feedback mechanisms.

Step-by-Step Explanation

Scan Barcode:

The process likely begins with a farmer scanning the barcode of the agricultural product they wish to sell. This could be done using the app's camera or by manually entering the product details.

Computing through Feedback Points:

Once the product is identified, the app likely uses a system of "feedback points" to assess the product's quality and trustworthiness. This could involve:

1. Historical Data: Analyzing past transactions involving this product or this seller to identify any patterns of quality issues or disputes.

2. User Reviews: Incorporating feedback from previous buyers who purchased the same product from this seller.

3. Expert Ratings: Potentially integrating ratings or assessments from agricultural experts or quality control agencies.

Trustworthy (TW) Factor:

Based on the analysis of feedback points, the app calculates a "Trustworthy (TW) Factor" for

the product. This factor represents the level of trust associated with the product's quality and the seller's reliability.

Checkout:

If the TW factor meets a certain threshold, the user proceeds to the checkout page.

Payment Options:

The user is then presented with two payment options:

1. Payment by Cash: The traditional method of exchanging cash upon delivery.
2. Online Payment: Facilitating transactions through an online payment portal.

Online Payment Portal:

If the user chooses online payment, they are redirected to a secure online payment portal to complete the transaction.

Transaction Completion:

Upon successful payment, the transaction is completed, and the app records the details, including the product information, seller details, buyer details, and payment method.

Significance for Farmers

This transaction process, with its emphasis on trust and feedback, offers several benefits to farmers using the Kisan Buddy app:

Enhanced Trust and Credibility: The TW factor helps build trust between farmers and buyers, showcasing the quality and reliability of their products.

Improved Market Access: By demonstrating trustworthiness, farmers can gain access to a wider market of potential buyers.

Fairer Pricing: The system can potentially help farmers achieve fairer prices for their products by showcasing their quality and reliability.

Reduced Disputes: By incorporating feedback and trust mechanisms, the app can help minimize disputes and disagreements between buyers and sellers.

Overall, the transaction page, with its focus on trust and feedback, plays a crucial role in creating a transparent and reliable marketplace for farmers using the Kisan Buddy application.

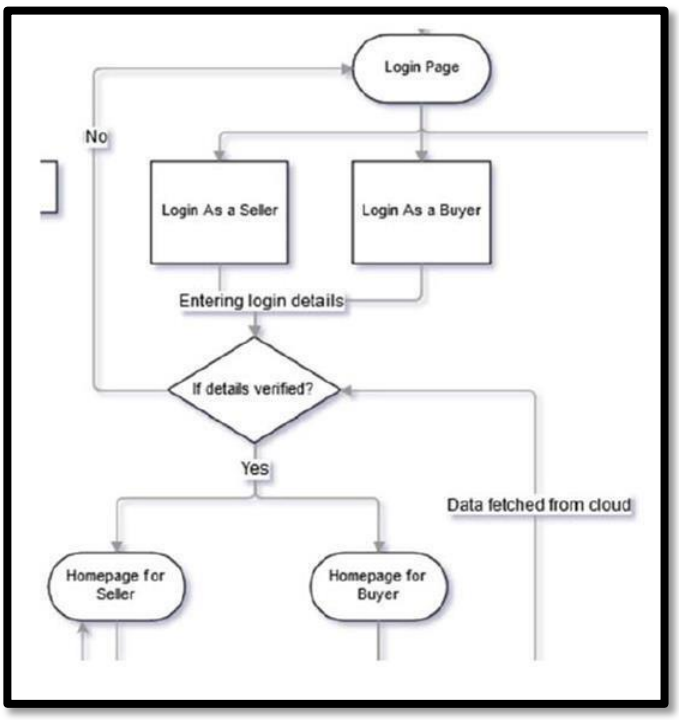

Figure 2.4 – Overview of all pages

This diagram provides a high-level overview of the different pages or screens that a user might encounter within the Kisan Buddy application. It highlights the key decision points and the flow of user interaction.

Key Elements

Login Page: This is the entry point for users. They are presented with two options:

Login as a Seller: For farmers or sellers who wish to use the app to list and sell their produce.

Login as a Buyer: For individuals or businesses who want to purchase agricultural products.

Entering Login Details: After selecting their role (seller or buyer), users are prompted to enter their login credentials (e.g., email address and password).

Data Validation: The app then validates the entered credentials. If the details are correct, the app proceeds to fetch the user's data from the cloud (presumably from Firebase).

Homepages:

Homepage for Seller: If the login was successful as a seller, the user is directed to the seller's homepage. This page likely provides features for listing products, managing orders, tracking sales, and accessing market information.

Homepage for Buyer: If the login was successful as a buyer, the user is directed to the buyer's homepage. This page might allow them to search for products, browse listings, place

orders, view transaction history, and access market insights.

Significance for Farmers

This diagram illustrates the user journey within the Kisan Buddy app, emphasizing the clear distinction between seller and buyer roles. By providing separate homepages and functionalities for each role, the app ensures a tailored experience for both farmers and buyers, enhancing usability and efficiency.

Additional Considerations

User Interface (UI) Design: The actual design of each page would play a crucial role in creating a user-friendly and engaging experience.

Error Handling: The app should implement robust error handling mechanisms to address invalid login credentials or other issues, providing informative messages to the user.

Security: The app must prioritize security measures to protect user data and prevent unauthorized access.

Overall, this diagram provides a foundational understanding of the user flow within the Kisan Buddy application, highlighting the key pages and decision points that shape the user experience.

CHAPTER-7

PROJECT EXECUTION TIMELINE

(GANTT CHART)

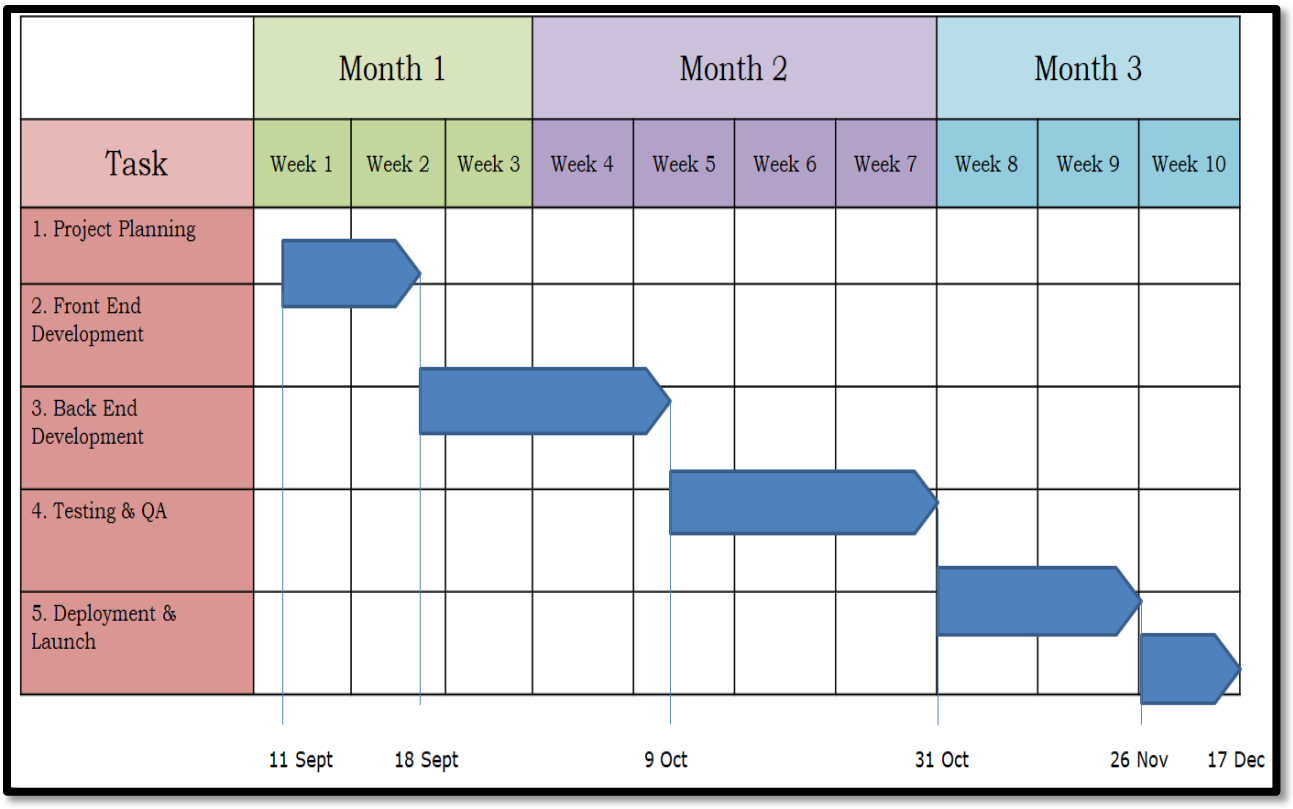

Figure 3.1

This Gantt chart visually represents the project schedule for the development of the Kisan Buddy mobile application. It outlines the various tasks involved in the project, their estimated durations, and their dependencies, providing a clear timeline for the development process.

Key Tasks and Durations

Project Planning: This initial phase involves defining project scope, objectives, requirements, and allocating resources. It is estimated to take one week.

Front-End Development: This phase focuses on building the user interface (UI) and user

experience (UX) of the application. It includes designing and developing the screens for user interaction, such as the login page, product listing, and transaction pages. This phase is expected to take two weeks.

Back-End Development: This phase involves developing the server-side logic and infrastructure of the application. This includes integrating with Firebase for authentication, data storage, and cloud functions. It is estimated to take three weeks.

Testing & QA: This critical phase involves rigorous testing of the application to identify and fix bugs, ensure functionality, and improve overall quality. This phase is estimated to take four weeks.

Deployment and Launch: This final phase involves deploying the completed application to the Google Play Store and launching it for public use. It is estimated to take two weeks.

Timeline and Dependencies

The chart visually depicts the timeline for each task, starting from September 11th and extending into December. The horizontal bars represent the duration of each task, while their positions on the timeline indicate their start and end dates.

The chart also implicitly suggests dependencies between tasks. For instance, Front-End Development likely depends on Project Planning to be completed, and Back-End Development likely depends on the completion of Front-End Development.

Significance for Kisan Buddy

This Gantt chart serves as a valuable tool for managing the Kisan Buddy project:

Project Management: It provides a clear roadmap for the development team, helping them track progress, identify potential bottlenecks, and allocate resources effectively.

Communication: The chart can be used to communicate the project schedule to stakeholders, such as investors, clients, and team members.

Risk Management: By visualizing the timeline, potential risks and delays can be identified and mitigated proactively.

Decision-Making: The chart can assist in making informed decisions regarding resource allocation, task prioritization, and project adjustments as needed.

Additional Considerations

Flexibility: Gantt charts are not set in stone. As the project progresses, adjustments might be necessary to accommodate unforeseen challenges or changing requirements.

Regular Updates: The chart should be regularly updated to reflect the actual progress of the project and any changes to the schedule.

The Gantt chart provides a crucial visual representation of the Kisan Buddy project schedule, aiding in effective project management, communication, and decision-making. By tracking progress and adapting to changes, the development team can ensure the timely and successful lanch of the application.

CHAPTER-8
OUTCOMES

The effective execution of the proposed mobile application for farmers will lead to several key outcomes that directly address the challenges faced by farmers in accessing markets and optimizing their produce sales. These outcomes will contribute to the overall efficiency, transparency, and profitability of agricultural transactions. Below are the anticipated outcomes:

8.1 Improved Market Access and Awareness

Outcome: Farmers will have easy access to a comprehensive list of nearby mandis (markets) where they can sell their produce.

Benefit: By displaying multiple mandi options depending on the location of farmer, the app will reduce the dependency on a limited set of markets, enabling farmers to explore better-selling opportunities. This will help them find markets with better prices or lower transaction costs.

8.2 Cost Optimization and Savings

Outcome: Farmers will receive detailed estimates of the total transaction costs, including transportation, mandi commission fees, and other relevant charges.

Benefit: The app's optimization feature will recommend the mandi with the least overall transaction cost, helping farmers save money on transportation and commissions. This will directly improve their profitability by ensuring that they sell their crops at the most cost-effective mandi.

8.3 Real-Time and Accurate Market Information

Outcome: The app will provide real-time information on mandi prices, transportation costs, and market availability, ensuring that farmers make decisions based on current market conditions.

Benefit: With up-to-date pricing and cost information, farmers will avoid selling at a loss due to outdated or inaccurate market data. Real-time updates can also help them make better decisions regarding when to sell and where to sell.

8.4 Increased Transparency in Transactions

Outcome: The app will break down all transaction costs, including commission rates and transportation fees, providing transparency to farmers regarding where their money is being spent.

Benefit: By offering clear, transparent cost estimates and comparisons, the app will foster trust in the system and ensure that farmers are not exploited by hidden charges. This transparency will help farmers make better-informed decisions, leading to fairer market transactions.

8.5 Enhanced Decision-Making for Farmers

Outcome: The optimization algorithm will present farmers with a comparative list of mandis, prioritizing the least expensive options based on total transaction costs.

Benefit: This will empower farmers to make better, more informed decisions about where to sell their produce, maximizing their income and reducing uncertainties in the marketplace. The app's recommendations will guide them towards the most profitable selling options.

8.6 Improved Profit Margins

Outcome: By selecting the most cost-effective mandis and reducing hidden transaction fees, farmers will increase their profit margins from each sale.

Benefit: The ability to compare different mandis and transaction costs will ensure that farmers are able to sell at the best possible price after accounting for all expenses. This can result in a more stable and increased income for farmers, especially for smallholder and marginal farmers.

8.7 Time and Effort Savings

Outcome: The app will save farmers time by helping them quickly identify the nearest mandis and calculate the optimal selling points.

Benefit: Farmers will no longer have to spend excessive time searching for market information or physically visiting multiple mandis to identify the optimal location for selling their crops. The app offers this information instantly, streamlining the decision- making process.

8.8 Increased Adoption of Digital Solutions in Agriculture

Outcome: The app will serve as a tool to increase the adoption of digital platforms among farmers, many of whom may be unfamiliar with technology.

Benefit: By providing a simple, user-friendly interface and valuable services, the app will encourage more farmers to adopt digital solutions. This will foster greater technological inclusion in rural areas, enhancing farmers' ability to leverage digital tools for better market access and financial management.

8.9 Scalable and Sustainable Solution

Outcome: The app will be designed to scale, allowing the addition of more mandis, crops, and features over time.

Benefit: As the user base grows, the system will expand its coverage to include more regions, mandis, and agricultural products, making it a sustainable and long-term solution for farmers. The backend architecture (using Firebase) allows for easy scalability to accommodate an increasing number of users and data.

8.10 Reduction in Exploitation of Farmers

Outcome: By ensuring transparency and providing accurate cost estimates, the app will reduce the exploitation of farmers by middlemen or market agents.

Benefit: The app's clear, upfront pricing information helps protect farmers from unfair market practices, ensuring they are paid a fair price for their produce. This will contribute to a more equitable agricultural marketplace, especially for small farmers who are often at a disadvantage.

CHAPTER-9

RESULTS AND DISCUSSIONS

This part outlines the expected outcomes from the implementation of the mobile application, followed by a discussion of the key outcomes, their impact on the farmers, and the broader implications for agricultural markets. The results are based on the features and functionalities that the app aims to provide, such as improved market access, cost optimization, and transparency.

9.1 User Adoption and Engagement

Expected Results:

The app is expected to experience a positive adoption rate among farmers, particularly those in semi-urban and rural areas. The simplicity of the interface and the direct benefits it offers, such as location-based mandi recommendations and cost-saving suggestions, are expected to drive engagement. Usage metrics, such as the rate of app engages and the number of active users, will offer valuable insights into its popularity and usability.

Discussion:

Challenges in Adoption: While the app offers a significant value proposition, there may be initial resistance to adopting technology, especially in rural areas where digital literacy can be a barrier. Outreach programs, training sessions, and partnerships with local agricultural bodies will be essential for ensuring widespread adoption.

Positive Outcomes: If the app is successfully adopted, it will encourage digital literacy among farmers, driving them to engage more with technology and data-driven decision- making, leading to increased market participation and efficiency.

9.2 Improved Decision-Making

Expected Results:

Farmers will have the ability to make more knowledgable decisions about where to sell their crops by comparing transaction costs (including mandi commissions and transportation costs) at different mandis.The app's recommendation algorithm is expected to suggest the most cost-effective mandi, improving the profitability of their transactions.

Discussion:

Effectiveness of Cost Optimization: The algorithm's effectiveness in identifying the least costly mandi will significantly influence the app's value. Farmers should notice a reduction in costs associated with transportation and commissions when following the app's recommendations, leading to improved profitability.

Real-World Variability: However, the practical impact of the optimization will depend on factors like fluctuating transportation costs (due to fuel prices or weather conditions) and varying mandi prices. The app will need to factor in such variability and provide real-time updates to ensure accuracy.

9.3 Transaction Cost Savings

Expected Results:

Farmers are expected to save on both direct and indirect transaction costs. These savings come from reduced transportation expenses (by selecting closer mandis) and lower commission fees (by selecting mandis with more favorable terms).A measurable reduction in overall transaction costs will lead to an increase in the farmer's net income.

Discussion:

Impact on Profitability:

The most significant benefit to farmers will be the reduction in transaction costs. By recommending the least expensive mandi, the app should help farmers retain more of the revenue from their sales, improving their overall financial health. Sustainability of Savings: For long-term sustainability, the app will need to ensure that mandi data is regularly updated, including any changes in commission rates, to ensure farmers continue to make informed, cost-effective decisions.

9.4 Increased Market Access Competition

Expected Results:

The app will facilitate better market access by listing a variety of nearby mandis, thereby opening up more opportunities for farmers to market their produce at competitive pricing.By being able to compare prices across multiple mandis, farmers can select the one offering the best deal, promoting a more competitive environment for agricultural goods.

Discussion:

Market Expansion: In regions with limited mandi options, the app could act as a bridge to help farmers access distant markets or mandis that they otherwise would not have considered. In this sense, the app may indirectly increase competition among mandis, potentially driving down prices or improving market transparency.

Challenges in Rural Areas: In areas where mandis are few or poorly connected, the effectiveness of the app might be limited. The app could also benefit from integrating more detailed geographical and infrastructural data to better match farmers with relevant markets.

9.5 Real-Time Data Accuracy and Market Insights

Expected Results:

Farmers will benefit from real-time market data, including mandi prices and transportation costs. The app will provide up-to-date information about the best selling options, ensuring farmers are not misinformed by outdated or inaccurate market prices.

Firebase's real-time database ensures that any changes in mandi prices or market conditions are immediately reflected in the app, keeping farmers informed.

Discussion:

Reliability of Data: The accuracy and timeliness of the data are crucial for the app's success. If real-time updates are delayed or inaccurate, it could negatively affect the farmers' decision-making, leading to mistrust in the system.

Collaboration with Mandi Authorities: Collaboration with local mandi authorities and agricultural bodies to ensure data accuracy and regular updates will be essential for maintaining the app's reliability.

9.6 Reduction in Exploitation by Middlemen

Expected Results:

With more transparent pricing and access to competitive mandi options, farmers should be able to avoid exploitative middlemen or agents who often manipulate prices or charge excessive commissions.The transparency in transaction costs will help farmers understand where their money is going and ensure they are not paying hidden or unfair fees.

Discussion:

Impact on Middlemen: The app may disrupt traditional market dynamics, especially for middlemen who act as intermediaries between farmers and mandis. However, it can

also provide a more transparent way for middlemen to operate by allowing them to offer competitive services.

Farmer Empowerment: By giving farmers more control over where and how they sell their produce, the app will empower them to negotiate better prices or bypass middlemen entirely. This shift could contribute to a more direct and fairer supply chain.

9.7 Scalability

Expected Results:

The app is expected to scale in terms of geographical coverage, crop types, and mandi options. The Firebase backend allows easy expansion as new regions, crops, and mandis are added to the system.

As user feedback and data are collected, new features can be added to enhance the app's functionality and usefulness for farmers.

Discussion:

Challenges in Scaling: As the app scales, maintaining the quality and accuracy of data will be increasingly challenging. Ensuring that the database is kept up to date across all regions and that the cost optimization algorithms remain effective will require robust infrastructure.

Potential for Partnerships: The app's scalability also provides opportunities for partnerships with agricultural organizations, government agencies, and private companies to expand its reach and impact, especially in underserved areas.

9.8 Farmer Satisfaction and Feedback

Expected Results:

Farmers will express higher satisfaction with the app due to its ability to save time, reduce costs, and increase market opportunities.The feedback loop through the app will allow developers to refine the system and adapt to evolving farmer needs.

Discussion:

User Feedback: Continuous user feedback will be crucial in refining the app. Incorporating farmers' suggestions for new features or improvements will ensure that the app remains relevant and practical.

CHAPTER-10

CONCLUSION

The proposed mobile application for farmers has the potential to significantly enhance the agricultural value chain by addressing key challenges such as market access, cost optimization, and transparency in transactions. By leveraging modern technologies like **Google Maps**, **Firebase**, and **location-based services**, the app empowers farmers to make well-knowledgable choices regarding where and how to sell their produce, ultimately helping them to maximize their income.

The core functionality of the app—providing real-time mandi information, calculating transaction costs, and recommending the least expensive market options—can substantially reduce costs related to transportation and mandi commissions. By promoting competition and transparency in the marketplace, the app encourages fairer pricing and provides farmers with more control over the sale of their produce, reducing dependency on middlemen who often exploit them.

In addition to improving financial outcomes, the app can also drive increased adoption of digital tools in rural areas, where technology may not be widely embraced. Its user-friendly interface and valuable market insights help bridge the digital divide, ensuring farmers have access to critical market data at their fingertips.

While the app holds promise, its success will depend on factors such as user adoption, data accuracy, and scalability. Addressing challenges like technological barriers and ensuring the timely updating of mandi prices will be crucial for maintaining trust and maximizing its benefits.

Overall, this project aims to improve the livelihoods of farmers, particularly smallholders and those in remote areas, by empowering them to make data-driven decisions. As the app evolves and expands, it has the potential to transform agricultural markets, improve economic stability for farmers, and support the sustainable development of agriculture in rural areas. With continuous feedback and technological updates, the app can become an invaluable resource for farmers across the country.

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APPENDIX-A

PSUEDOCODE

Main activity Kotlin code

```
package com.example.myapplication

import android.content.Intent
import android.os.Bundle
import android.view.Gravity
import android.widget.*
import androidx.appcompat.app.AppCompatActivity
import androidx.appcompat.widget.SearchView
import com.google.android.material.bottomnavigation.BottomNavigationView

class MainActivity : AppCompatActivity() {

    private lateinit var searchView: SearchView
    private lateinit var cropGrid: GridLayout
    private lateinit var scrollView: ScrollView

    private val crops = listOf(
        "Wheat(KG)", "Rice(KG)", "Maize(Pcs)", "Barley(KG)", "Oats(KG)",
        "Soybean(KG)", "Sugarcane(Pcs)", "Cotton(KG)", "Potato(KG)", "Tomato(KG)",
        "Onion(KG)", "Garlic(KG)", "Pepper(KG)", "Cucumber(KG)", "Carrot(KG)",
        "Spinach(Pcs)", "Peas(KG)", "Lettuce(Pcs)", "Strawberry(KG)", "Mango(KG)"
    )

    private val cropImages = listOf(
        R.drawable.wheat, R.drawable.rice, R.drawable.maize, R.drawable.barley,
R.drawable.oats,
        R.drawable.soybean, R.drawable.sugarcane, R.drawable.cotton, R.drawable.potato,
R.drawable.tomato,
        R.drawable.onion, R.drawable.garlic, R.drawable.pepper, R.drawable.cucumber,
R.drawable.carrot,
        R.drawable.spinach, R.drawable.peas, R.drawable.lettuce, R.drawable.strawberry,
R.drawable.mango
    )

    private val cropCounts = MutableList(crops.size) { 0 } // Initialize counts with 0

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        searchView = findViewById(R.id.searchView)
```

```
cropGrid = findViewById(R.id.cropGrid)
scrollView = findViewById(R.id.scrollView)

// Populate GridLayout with crops
populateGrid()

// Set up SearchView filtering
searchView.setOnQueryTextListener(object : SearchView.OnQueryTextListener {
    override fun onQueryTextSubmit(query: String?): Boolean {
        return false
    }

    override fun onQueryTextChange(newText: String?): Boolean {
        filterGrid(newText)
        return true
    }
})

// Bottom Navigation Setup
val bottomNav = findViewById<BottomNavigationView>(R.id.bottomNav)
bottomNav.setOnNavigationItemSelectedListener { menuItem ->
    when (menuItem.itemId) {
        R.id.nav_home -> {
            // Show crops grid
            scrollView.visibility = ScrollView.VISIBLE
            true
        }
        R.id.nav_profile -> {
            // Open Profile Activity
            startActivity(Intent(this, ProfileActivity::class.java))
            scrollView.visibility = ScrollView.GONE
            true
        }
        R.id.nav_cart -> {
            // Open Cart Activity
            val cartItems = crops.indices
                .filter { cropCounts[it] > 1 }
                .map { cropImages[it] to crops[it] }
            scrollView.visibility = ScrollView.GONE
            true
        }
        else -> false
    }
}



// Default selection: Home
```

```
    bottomNav.selectedItemId = R.id.nav_home
}

private fun populateGrid() {
    cropGrid.removeAllViews()
    for (i in crops.indices) {
        val itemContainer = LinearLayout(this).apply {
            orientation = LinearLayout.VERTICAL
            layoutParams = GridLayout.LayoutParams().apply {
                width = 0
                height = GridLayout.LayoutParams.WRAP_CONTENT
                columnSpec = GridLayout.spec(GridLayout.UNDEFINED, 1f)
                setMargins(8, 8, 8, 8)
            }
        }

        // ImageView
        val imageView = ImageView(this).apply {
            setImageResource(cropImages[i])
            layoutParams = LinearLayout.LayoutParams(350, 350).apply {
                gravity = Gravity.CENTER
            }
            scaleType = ImageView.ScaleType.CENTER_CROP
        }

        // TextView
        val textView = TextView(this).apply {
            text = crops[i]
            textAlignment = TextView.TEXT_ALIGNMENT_CENTER
            textSize = 20f
            layoutParams = LinearLayout.LayoutParams(
                LinearLayout.LayoutParams.WRAP_CONTENT,
                LinearLayout.LayoutParams.WRAP_CONTENT
            ).apply {
                setMargins(0, 8, 0, 0)
                gravity = Gravity.CENTER
            }
        }

        // Counter Buttons Layout
        val counterLayout = LinearLayout(this).apply {
            orientation = LinearLayout.HORIZONTAL
            gravity = Gravity.CENTER
        }

        val decrementButton = Button(this).apply {
            text = "–"
            textSize = 30f
            gravity = Gravity.CENTER
```

```
            setBackgroundColor(resources.getColor(R.color.light_blue))
            setTextColor(resources.getColor(R.color.black))
            layoutParams = LinearLayout.LayoutParams(120, 120)
            setPadding(10, 10, 10, 10)
            setOnClickListener {
                if (cropCounts[i] > 0) cropCounts[i]--
                updateCounterText(i, itemContainer)
            }
        }

        val counterText = TextView(this).apply {
            text = cropCounts[i].toString()
            textAlignment = TextView.TEXT_ALIGNMENT_CENTER
            textSize = 26f
            gravity = Gravity.CENTER
        }

        val incrementButton = Button(this).apply {
            text = "+"
            textSize = 30f
            gravity = Gravity.CENTER
            setBackgroundColor(resources.getColor(R.color.light_blue))
            setTextColor(resources.getColor(R.color.black))
            layoutParams = LinearLayout.LayoutParams(120, 120)
            setPadding(10, 10, 10, 10)
            setOnClickListener {
                cropCounts[i]++
                updateCounterText(i, itemContainer)
            }
        }

        counterLayout.addView(decrementButton)
        counterLayout.addView(counterText)
        counterLayout.addView(incrementButton)

        itemContainer.addView(imageView)
        itemContainer.addView(textView)
        itemContainer.addView(counterLayout)
        cropGrid.addView(itemContainer)
    }
}

private fun updateCounterText(index: Int, container: LinearLayout) {
    val counterLayout = container.getChildAt(2) as LinearLayout
    val textView = counterLayout.getChildAt(1) as TextView
    textView.text = cropCounts[index].toString()
}

private fun filterGrid(query: String?) {
```

```
        cropGrid.removeAllViews()
        if (query.isNullOrEmpty()) {
            populateGrid()
            return
        }
        for (i in crops.indices) {
            if (crops[i].contains(query, ignoreCase = true)) {
                val itemContainer = LinearLayout(this).apply {
                    orientation = LinearLayout.VERTICAL
                    layoutParams = GridLayout.LayoutParams().apply {
                        width = 0
                        height = GridLayout.LayoutParams.WRAP_CONTENT
                        columnSpec = GridLayout.spec(GridLayout.UNDEFINED, 1f)
                        setMargins(8, 8, 8, 8)
                    }
                }

                val imageView = ImageView(this).apply {
                    setImageResource(cropImages[i])
                    layoutParams = LinearLayout.LayoutParams(300, 300).apply {
                        gravity = Gravity.CENTER
                    }
                    scaleType = ImageView.ScaleType.CENTER_CROP
                }

                val textView = TextView(this).apply {
                    text = crops[i]
                    textAlignment = TextView.TEXT_ALIGNMENT_CENTER
                    textSize = 26f
                    layoutParams = LinearLayout.LayoutParams(
                        LinearLayout.LayoutParams.WRAP_CONTENT,
                        LinearLayout.LayoutParams.WRAP_CONTENT
                    ).apply {
                        setMargins(0, 8, 0, 0)
                        gravity = Gravity.CENTER
                    }
                }

                itemContainer.addView(imageView)
                itemContainer.addView(textView)
                cropGrid.addView(itemContainer)
            }
        }
    }
}
```

Main activity XML code

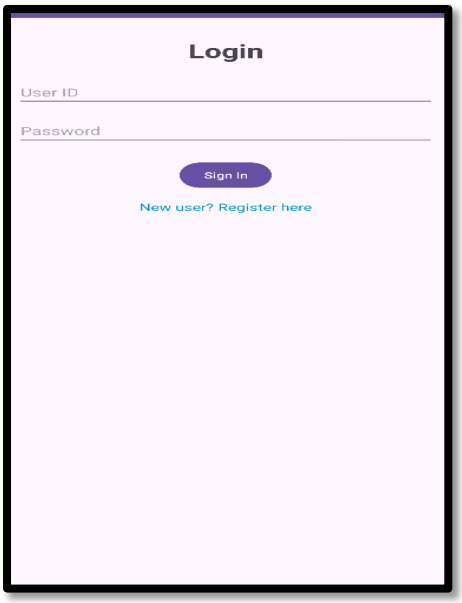
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <!-- Header Section -->
    <androidx.constraintlayout.widget.ConstraintLayout
        android:id="@+id/header"
        android:layout_width="match_parent"
        android:layout_height="80dp"
        android:background="#D9E27F"
        app:layout_constraintTop_toTopOf="parent">

        <TextView
            android:id="@+id/appTitle"
            android:layout_width="match_parent"
            android:layout_height="match_parent"
            android:fontFamily="@font/alfa_slab_one"
            android:gravity="center"
            android:text="KISAN BUDDY"
            android:textAlignment="center"
            android:textColor="#288528"
            android:textSize="38sp" />
    </androidx.constraintlayout.widget.ConstraintLayout>

    <!-- Search Section -->
    <LinearLayout
        android:id="@+id/searchContainer"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        android:padding="8dp"
        app:layout_constraintTop_toBottomOf="@+id/header">

        <androidx.appcompat.widget.SearchView
            android:id="@+id/searchView"
            android:layout_width="match_parent"
            android:layout_height="70dp"
            android:iconifiedByDefault="false"
            android:queryHint="Search for crops..." />
    </LinearLayout>
```

```
    <!-- Scrollable Grid Section -->
    <ScrollView
        android:id="@+id/scrollView"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        app:layout_constraintBottom_toTopOf="@id/bottomNav"
        app:layout_constraintTop_toBottomOf="@+id/searchContainer">

        <GridLayout
            android:id="@+id/cropGrid"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:columnCount="3"
            android:orientation="horizontal"
            android:padding="8dp">
            <!-- Dynamic content added programmatically -->
        </GridLayout>
    </ScrollView>

    <!-- Horizontal Bottom Navigation -->
    <com.google.android.material.bottomnavigation.BottomNavigationView
        android:id="@+id/bottomNav"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#D9E27F"
        app:menu="@menu/bottom_nav_menu"
        app:itemIconTint="@color/black"
        app:itemTextColor="@color/black"
        app:labelVisibilityMode="labeled"
        app:layout_constraintBottom_toBottomOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout
```

APPENDIX-B

OUTPUT SCREENSHOTS

Figure 4.1 – Welcome page output(Splash Screen)



. **Figure 4.2 - Login Page Output**

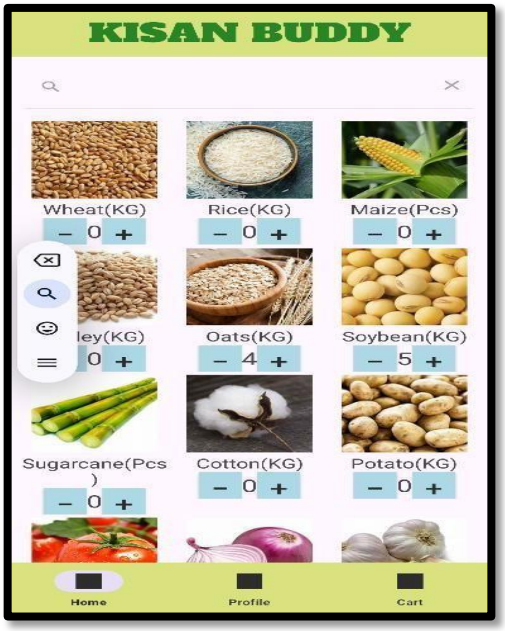


Figure 4.3 - Home Page Output

Figure 4.4 – Search Item page

Output

Figure 4.5 – Cart Section page

Output

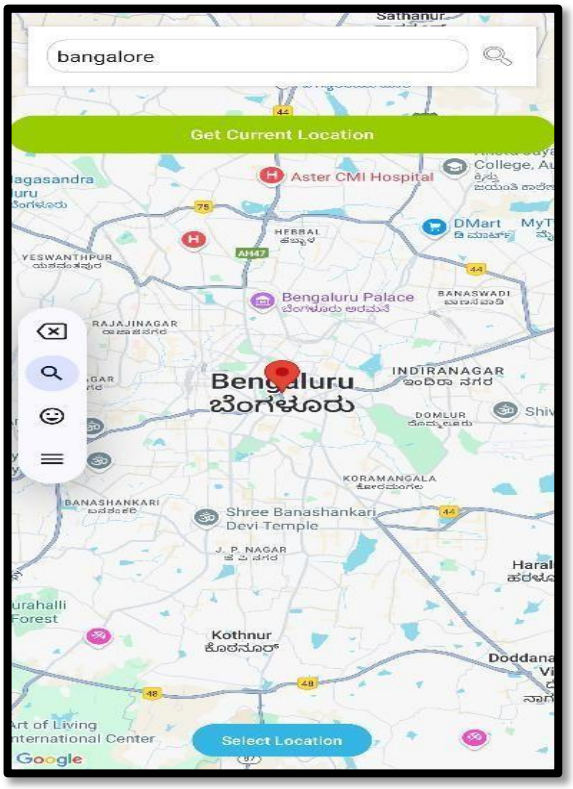


Figure 4.6 – Redirected to Google Maps

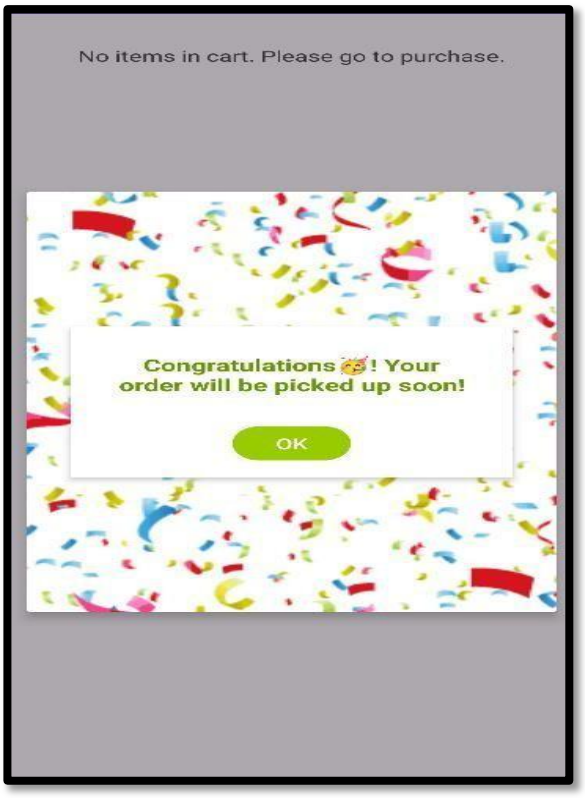


Figure 4.7 – Order Confirmation Page Output

APPENDIX-C
ENCLOSURES

Conference Paper Presented Certificates of all Students

International Journal of Scientific Research and Engineering Trends (IJSRET)

This is to certify that
KV Achyuth Reddy
has published a paper entitled
"Kissan Buddy-An Android Application for Estimating The Nearest Mandi and Transaction Costs for Farmers"
in International Journal of Scientific Research and Engineering Trends, in Volume 11, Issue 01, Jan-Feb-2025

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"Kissan Buddy-An Android Application for Estimating The Nearest Mandi and Transaction Costs for Farmers"
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This is to certify that
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has published a paper entitled
"Kissan Buddy-An Android Application for Estimating The Nearest Mandi and Transaction Costs for Farmers"
in International Journal of Scientific Research and Engineering Trends, in Volume 11, Issue 01, Jan-Feb-2025

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has published a paper entitled
"Kissan Buddy-An Android Application for Estimating The Nearest Mandi and Transaction Costs for Farmers"
in International Journal of Scientific Research and Engineering Trends, in Volume 11, Issue 01, Jan-Feb-2025

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Plagiarism Check Report

M_Swapna,_Final_report_of_kissan_buddy

ORIGINALITY REPORT

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8	commonsware.com Internet Source	<1%
9	Submitted to Illinois Institute of Technology Student Paper	<1%

DETAILS OF MAPPING THE PROJECT WITH SUSTAINABLE DEVELOPMENT GOALS

The project described — a mobile app for farmers that provides information about the nearest mandis (markets) for selling their produce, estimates transaction costs, and offers the least-cost transaction option — can contribute to several SDGs. The project uses **Android**, **Google Maps**, and **Firebase** as the backend, focusing on agricultural support and transaction efficiency.

Here's how this project can be mapped to specific SDGs:

1. SDG 1: No Poverty

Relevance:

This app can directly contribute to **SDG 1** by helping farmers increase their income and reduce financial instability. By providing farmers with information about the nearest mandis and the cost of transactions, the app helps them make better decisions about where and when to sell their produce, ensuring they get the best price.

Key Targets:

Target 1.2: Reduce the percentage of the people living in poverty.

Target 1.4: Fair access to economic resources, including access to markets, financial services, and technology.

Project Contribution:

By enabling farmers to identify the nearest mandi and estimate the costs associated with the transaction, the app supports farmers in reducing transaction losses and maximizing their income, thus helping alleviate poverty.

2. SDG 2: Zero Hunger

Relevance:

The app supports **SDG 2: Zero Hunger** by helping farmers optimize the selling process, potentially leading to better market access and more efficient agricultural practices. This can indirectly improve food security by enabling farmers to produce food more efficiently and sell it at better prices, contributing to sustainable agricultural systems.

Key Targets:

Target 2.3: Increase the efficiency of farming and the earnings of small-scale farmers.

Target 2.4: Promote long-term, eco-friendly agricultural practices.

Project Contribution:

By providing farmers with reliable market information and enabling better pricing for their produce, the app can improve their economic situation, encourage sustainable farming practices, and increase food availability by enhancing the financial viability of farming.

3. SDG 8: Decent Work and Economic Growth

Relevance:

SDG 8 focuses on promoting broad-based and lasting economic development, job creation, and fair employment opportunities for everyone. The app directly contributes to this goal by helping farmers access better markets potentially resulting in to higher earnings, increased job stability in the agricultural sector, and more sustainable farming practices.

Key Targets:

Target 8.3: Encourage policies that foster economic growth, job oppurtunities and support for new business.

Target 8.5: Attain complete and meaningful employment with fair working conditions for all individuals both women and men those in vulnerable conditions.

Project Contribution:

The app aids farmers in improving their market efficiency, leading to better income opportunities and job stability in rural and agricultural sectors. Farmers can expand their reach, increase sales, and improve the economic sustainability of their farming businesses.

4. SDG 9: Industry, Innovation, and Infrastructure

Relevance:

This app is an example of technological innovation applied to agriculture. By using modern tools like **Google Maps**, **Android**, and **Firebase**, the app enhances infrastructure in rural areas, providing farmers with better access to market data and transaction transparency.

Key Targets:

Target 9.3: Enhance the availability of financial services, such as affordable loans, to small-scale businesses, especially in developing nations, and facilitate their inclusion in supply chains and markets.

Target 9.4: Improve infrastructure and modernize industries to ensure their sustainability.

Project Contribution:

The app promotes the integration of digital tools into traditional agricultural practices. It facilitates access to modern infrastructure (such as Google Maps) and digital market access, enhancing the potential for rural businesses to thrive in a digital economy.

5. SDG 12: Responsible Consumption and Production

Relevance:

The app contributes to **SDG 12** by helping farmers optimize their transactions and minimize costs, leading to a more efficient agricultural supply chain. By providing cost estimates and

reducing unnecessary transportation costs, the app contributes towards more eco-friendly and ethical patterns of consumption and production.

Key Targets:

Target 12.7: Encourage government purchasing policies that are sustainable.

Target 12.8: Foster understanding of sustainable development and responsible living in harmony with nature.

Project Contribution:

The app helps farmers make informed decisions that minimize waste and reduce transportation emissions, contributing to more sustainable agricultural practices. By identifying the least-cost transaction, the app ensures that farmers optimize their resources, resulting in more efficient production and consumption.

6. SDG 13: Climate Action

Relevance:

SDG 13 Concentrates on implementing immediate measures to address climate change and its effects. While this app is not directly related to climate action, it can indirectly contribute by promoting efficiency in the agricultural sector, which can lead to less waste, lower emissions from transportation, and better resource management.

Key Targets:

Target 13.1: Enhance the ability to withstand and adapt to climate-related risks and challenges.

Target 13.2: Incorporate climate change considerations into national policies, plans, and strategies.

Project Contribution:

By reducing transportation distances and helping farmers optimize their selling processes, the app could indirectly reduce the carbon footprint associated with agricultural logistics.

7. SDG 17: Partnerships for the Goals

Relevance:

SDG 17 emphasizes the need for strong partnerships to achieve the SDGs. The app could foster collaborations between local agricultural stakeholders, tech companies, government agencies, and market facilitators to enhance agricultural market efficiency.

Key Targets:
Target 17.6: Strengthen cooperation across North-South, South-South, and triangular regions in science, technology, and innovation.

Target 17.9: Increase global assistance for effective and focused capacity-building efforts in developing nations.

Project Contribution:

The app fosters partnerships between tech providers, farmers, and market actors to improve agricultural efficiency. By facilitating information flow and market access, it builds networks that support agricultural development.

Mapping Summary Table

SDG	Relevant Targets	Project Contribution
SDG 1: No Poverty	1.2, 1.4	Increases farmers' income, reduces poverty, ensures market access
SDG 2: Zero Hunger	2.3, 2.4	Improves market access, promotes sustainable agricultural practices
SDG 8: Decent Work and Economic Growth	8.3, 8.5	Supports job creation in rural economies, promotes fair employment in agriculture
SDG 9: Industry, Innovation, and Infrastructure	9.3, 9.4	Promotes digital innovation and infrastructure development in agriculture
SDG 12: Responsible Consumption and Production	12.7, 12.8	Minimizes waste and optimizes resources in agricultural transactions
SDG 13: Climate Action	13.1, 13.2	Reduces transportation emissions, promotes sustainable agricultural logistics
SDG 17: Partnerships for the Goals	17.6, 17.9	Fosters partnerships between farmers, tech providers, and market stakeholders

Table 2