

Sri Lanka Institute of Information Technology



AgroNest - Fertilizer Management System



The cover of the AgroNest project report. At the top left, there is a green stylized 'Y' shape. Next to it, the text 'Information Technology Project - IT2080' is displayed. The main title 'AgroNest' is written in a large, light green, lowercase font. Below the title, '- Project Report -' is written in a smaller, black font. To the right of the title, the words 'FUTURE OF AGRICULTURE.' are visible. The central part of the cover features a photograph of a hand holding dark soil. Surrounding this image are several circular icons: a water droplet, a sun, a battery, a plant, and a gear. On the left side, the text 'Agro Nest' is written in large white letters, with 'Fertilizer Management System' written below it in smaller white letters. The bottom left corner contains the text 'System' and 'Fertilizer Management' in Sinhala script. The entire cover has a dark background with a subtle network pattern.

- 2024 May -

DECLARATION

We declare that this project report or part of it was not a copy of a document done by any organization, university, any other institute, or a previous student project group at SLIIT and was not copied from the Internet or other sources.

PROJECT DETAILS

Project Title: AgroNest - Fertilizer Management System.

GitHub Repository: <https://github.com/VeenathT/AgroNest>

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ABSTRACT

The AgroNest Fertilizer Management System is a state-of-the-art solution designed to modernize and streamline the distribution of fertilizers in agriculture. It's a web-based platform that brings together farmers, dealers, laboratories, and administrators, offering them a wide range of tools and features to manage various aspects of fertilizer distribution effectively. With AgroNest, farmers can easily place orders, provide feedback on products and services, analyze the quality of their soil, and monitor the performance of their crops. By harnessing advanced technologies and innovative design, AgroNest empowers farmers to make better decisions about fertilizer usage, leading to improved crop yields and sustainable farming practices. The platform is user-friendly, secure, and scalable, making it suitable for agricultural operations of all sizes. With its comprehensive suite of features, AgroNest is poised to revolutionize the way fertilizers are managed and distributed in agriculture, ushering in a new era of efficiency, transparency, and collaboration.



We extend our sincere gratitude to all those who have contributed to the success of our ITP project group. First and foremost, we would like to express our appreciation to Mr. Sayuru, Manager at Hayleys Fertilizer Holding Limited, for his invaluable support and guidance throughout the project. His insights and assistance in gathering requirements were instrumental in shaping the direction of our work.

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LIST OF ABBREVIATIONS

Table 0.1 List of Abbreviations

Abbreviation	Description
MERN	MongoDB, Express, React Js, Node Js
FMS	Fertilizer Management System
UI	User Interface
SD	Sequence Diagram
SDLC	Software Development Life Cycle

CHAPTER - 1

INTRODUCTION

BACKGROUND

What is Fertilizer Management System

A Fertilizer Management System is a sophisticated digital platform that revolutionizes the way farmers interact with fertilizers, offering a comprehensive toolkit to optimize crop productivity and sustainability. Our AgroNest Fertilizer Management System goes beyond mere assistance; it serves as a strategic partner for farmers, providing invaluable insights and guidance at every stage of the fertilization process. Through advanced features and intuitive design, our system empowers farmers to make informed decisions about fertilizer usage, ensuring that each application is tailored to meet the specific needs of their crops and soil conditions.

At its core, our system acts as a centralized repository for all fertilizer-related data, aggregating information from soil tests, crop nutrient requirements, and environmental factors. By leveraging this wealth of data, our system generates personalized fertilizer recommendations that take into account the unique characteristics of each farm, enabling farmers to achieve optimal yields while minimizing waste and environmental impact. Whether it's selecting the right type of fertilizer, determining the optimal application rate, or scheduling applications based on weather forecasts, our system provides farmers with the tools and knowledge they need to maximize the effectiveness of their fertilization efforts.

Moreover, our system goes beyond simple recommendation; it actively guides farmers through the entire fertilization process, from planning and application to monitoring and evaluation. Farmers can access real-time data on their crops' nutrient levels and growth progress, allowing them to adjust their fertilization strategies as needed to achieve the desired outcomes. Additionally, our system offers comprehensive analytics and reporting features, enabling farmers to track their fertilizer usage over time, identify trends and patterns, and make data-driven decisions to improve their farming practices.

Overall, our Fertilizer Management System represents a paradigm shift in agricultural technology, harnessing the power of data and analytics to empower farmers and promote sustainable farming practices. With its user-friendly interface, personalized recommendations, and comprehensive features, our system equips farmers with the tools they need to succeed in today's rapidly evolving agricultural landscape.

Introduction to the Web Application

Our web application represents a pioneering advancement in agricultural technology, offering a comprehensive solution to optimize the management of fertilizers and empower stakeholders across every stage of the agricultural value chain. Leveraging state-of-the-art technologies and integrating sophisticated features, our platform transforms the landscape of agricultural operations, revolutionizing the way farmers, dealers, laboratories, and administrators engage with fertilizer-related processes.

Fundamentally, our software serves as a dynamic hub for facilitating seamless collaboration and communication among farmers and stakeholders. Through intuitive functionalities, farmers can effortlessly connect with local dealers and place orders. Moreover, our integrated feedback and rating systems empower farmers to provide invaluable insights on dealer performance and soil testing services, fostering greater accountability and transparency throughout the agricultural ecosystem.

Beyond facilitating transactions, our application is designed to deliver actionable intelligence by leveraging advanced data analytics and personalized recommendations. By analyzing soil samples and other pertinent data points, our platform offers tailored suggestions to farmers, enabling them to make informed decisions about fertilizer usage, crop management, and soil health. This empowers farmers to optimize their agricultural practices, maximize crop yields, and enhance overall farm profitability.

For administrators, our application offers a robust suite of tools and features designed to streamline operational workflows and drive strategic decision-making. Comprehensive dashboards provide at-a-glance insights into key performance metrics, allowing administrators to monitor trends, identify potential challenges, and proactively address issues before they escalate. Through advanced analytical instruments, administrators can derive actionable intelligence from data, enabling them to fine-tune fertilizer management strategies, allocate resources efficiently, and drive sustainable growth.

Furthermore, our application functions as a centralized repository for the exchange of agricultural information and product promotion. By facilitating targeted distribution and management of promotional content, our platform helps attract users, increase engagement, and ultimately drive sales.

Key features of our web application include:

- Farmer Profile and Soil Quality Management.
- Dealer Profile and Inventory Management.
- Order Management.
- Laboratory Management.
- Feedback and Inquiry Management.
- Manage Admin Dashboard.
- System Data Analysis.
- Article and Promotion Management.

Problem and motivation

Problem

Upon examination of current fertilizer management practices within agricultural processes, it becomes evident that there are several critical challenges plaguing the smooth operation of agricultural systems. These challenges stem from outdated methodologies and disjointed approaches, leading to a myriad of pressing issues that significantly impact agricultural productivity and farmer livelihoods:

Challenges in Fertilizer Accessibility:

Farmers, particularly those in remote or rural areas, face substantial hurdles in accessing the fertilizers they require in a timely manner. This is often due to logistical constraints, inadequate infrastructure, and bureaucratic red tape. As a result, farmers are forced to contend with delays in obtaining fertilizers, which disrupt planting schedules and impede crop growth.

Impact of Fertilizer Scarcity on Yield:

The persistent shortage of fertilizers exacerbates the challenges faced by farmers, directly affecting crop yield and quality. Without access to essential nutrients, plants struggle to thrive, leading to stunted growth, reduced yields, and diminished crop quality. This not only jeopardizes food security but also undermines the economic viability of farming operations.

Communication Gaps Between Farmers and Dealers:

Communication breakdowns between farmers and fertilizer dealers exacerbate the challenges associated with fertilizer accessibility. Poor communication channels, coupled with a lack of transparency and accountability, contribute to misunderstandings, delays, and missed opportunities for farmers to acquire the fertilizers they need. This results in frustration and inefficiencies throughout the supply chain.

Inefficiencies in Distribution Channels:

The existing distribution channels for fertilizers are plagued by inefficiencies and bottlenecks, hindering the smooth flow of goods from suppliers to end-users. Factors such as fragmented supply chains, inadequate storage facilities, and unreliable transportation networks exacerbate the challenges faced by farmers in obtaining fertilizers in a timely manner. These inefficiencies not only increase costs but also compromise the reliability and availability of fertilizers, particularly during peak seasons.

Missing Feedback Mechanism:

The absence of a formalized feedback mechanism further compounds the challenges associated with fertilizer management. Without a structured means for farmers to provide feedback on their experiences with fertilizers, issues such as product quality, efficacy, and availability remain unaddressed. This lack of feedback not only hampers the resolution of problems but also inhibits opportunities for continuous improvement and innovation in fertilizer management practices.

Motivation

We are excited about the development of a Fertilizer Management System aimed at revolutionizing agricultural practices, enhancing operational efficiency, and promoting sustainability within the farming community. Traditional methods of fertilizer management are often labor-intensive, error-prone, and reliant on outdated practices.

Automation and Efficiency

Our system represents a paradigm shift from manual to automated processes, empowering farmers with advanced tools and technologies to streamline their fertilizer management practices. By automating routine tasks and processes, such as inventory tracking, order management, and data analysis, our system significantly reduces the burden on farmers, allowing them to focus their time and resources on core agricultural activities.

Informed Decision-Making

Central to our system is the provision of accurate and up-to-date information that enables farmers to make informed decisions regarding fertilizer usage. By consolidating data from various sources, including soil analysis reports, crop nutrient requirements, and weather forecasts, our system provides farmers with comprehensive insights into optimal fertilizer application practices tailored to their specific farming conditions.

Sustainability and Environmental Responsibility

We are committed to promoting environmentally responsible agricultural practices through our Fertilizer Management System. By providing farmers with access to real-time data on fertilizer consumption and usage patterns, our system empowers them to optimize their fertilizer application practices, minimizing waste and environmental impact. Additionally, by facilitating online transactions and eliminating the need for physical store visits, our system reduces carbon emissions associated with transportation and logistics, contributing to a greener and more sustainable agricultural ecosystem.

Simplified Processes and Enhanced Accessibility

Our system is designed with the farmer's convenience and accessibility in mind. Through intuitive user interfaces and streamlined processes, we aim to simplify the fertilizer procurement process, enabling farmers to easily register, place orders, and make payments online. By removing barriers to entry and fostering greater accessibility, our system ensures that all farmers, regardless of their technological proficiency or geographical location, can benefit from the advantages of modern agricultural management practices.

Advancing Agriculture through Technology

At the heart of our motivation lies a deep-seated commitment to advancing agriculture through the integration of technology. By harnessing the power of digital tools and innovations, we aim to empower farmers with the knowledge, resources, and capabilities they need to thrive in an increasingly complex and dynamic agricultural landscape. Through our efforts, we aspire to contribute to the creation of a more prosperous, sustainable, and environmentally conscious agricultural community.

Literature review

The research on fertilizer management and agricultural technology shows that good systems can make farming better. These systems help use nutrients better, protect the environment, and support sustainable farming. Technology, like digital platforms, makes farming easier by improving communication and giving farmers helpful information. It's important for farmers to give feedback and talk with others in the farming community. Testing soil is also important because it helps farmers know what their soil needs and how to use fertilizers wisely. Using data and technology can help make farming more efficient and improve decision-making. Sharing knowledge and promoting farming practices are also key to helping farmers succeed. Our project aims to use all this research to build a system that helps farmers grow crops better and make farming easier. Within the sphere of agriculture services and products companies such as Baur [8] , Agstar [9] ,and Colombo Commercial Fertilizer(CCF)[10] compete for dominance in the market. For the literature review we did research on similar websites that already exist (mentioned above) and compared our web application's functions and got the information's about what function we need to improve. As a result, we identified there are no user management systems in the examined systems. However, our system has user management including farmers and dealers. In addition, there is no payment management on the similar websites. All the web applications provide place an inquiry to order fertilizer products and service and have facility to contact with the company. In result of that we found user can view the available fertilizer products in their web applications. We have found there are facilities to access laboratory service using web application directly. We found one web application [10] that provides laboratory service however it's not run in web application. In our system we will provide order management facility. In the other hand Agronest is not just a tool for viewing fertilizer products making inquiries and connecting with the company but it has a excellent user account management feature In addition to Agronest has great laboratory service rather than others.

FUTURE OF AGRICULTURE.

Table 0.1 Literature Review

Feature	Agronest	CCF	Baur	Agstar
User Management	✓	✗	✗	✗
Order Management	✓	✗	✗	✗
Laboratory Service	✓	✗	✓	✗
View Fertilizer stocks	✓	✗	✓	✓
Feedback / inquiry.	✓	✓	✓	✓
Payment Management	✓	✗	✗	✗

Aim and Objectives

Our project goal is to develop a comprehensive fertilizer management system to overcome challenges faced by the farmers and the stakeholders of the company. Our system facilitates efficient and enhanced fertilizer distribution while empowering farmers with guidance, personalized recommendations, and soil quality analysis services to help them get the maximum harvest.

Aims:

Feedback and Inquiry Management:

Our aim is to create a platform where farmers can share feedback and rate their experiences with fertilizer dealers. This will help foster a sense of community and continuous improvement within the agricultural ecosystem. Additionally, an inquiry section will allow farmers to seek assistance with any problems they encounter.

Order Management:

We aim to empower farmers by making it easy for them to find nearby fertilizer dealers, explore available products, place orders, and track deliveries all in one place.

Farmer Profile and Soil Quality Management:

Our goal is to enable farmers to locate nearby laboratories for soil testing, request tests, schedule appointments, and submit soil test reports for analysis. This will provide farmers with valuable insights into their soil quality and guide them in making informed decisions about fertilizer usage.

Laboratory Management:

We aim to ensure efficient and timely soil testing services by managing sample collection, analysis, and report delivery. This will enable farmers to receive accurate results promptly, helping them make informed decisions about soil management.

Manage Admin Dashboard:

Our aim is to provide administrators with a comprehensive dashboard to monitor and manage various aspects of the fertilizer management system, including dealer feedback, fertilizer suggestions, laboratory feedback, and analysis reports.

System Data Analysis:

We aim to enable system managers to conduct in-depth analysis of fertilizer-related data and dealer performance. Periodic reports generated from this analysis will inform strategic decision-making to improve system efficiency.

Dealer Profile and Inventory Management:

Our goal is to provide dealers with a user-friendly dashboard to manage their profiles, available fertilizer categories, and sales transactions. Dealers can also specify selling locations and track order statuses.

Article and Promotion Management:

We aim to create a platform where the company can showcase promotions, notifications, and articles related to agriculture and fertilizer management. This will engage users and provide valuable information and updates to farmers and other stakeholders.

Objectives:

Optimize Fertilizer Distribution Process:

Our goal is to make sure farmers get their fertilizers quickly and easily. We'll do this by connecting them with nearby fertilizer dealers who can deliver their orders on time. This will help farmers plan their planting without delays.

Develop an Interactive Platform:

We want to create a website or app that farmers can use easily. They'll be able to see different types of fertilizers available and give feedback on the ones they've used. This will make communication better between farmers and the people who sell fertilizers.

Empower Farmers with Soil Quality Analysis:

We plan to set up labs where farmers can send samples of their soil. These labs will test the soil and tell the farmers what nutrients it needs. This will help farmers know how to make their soil better for growing crops.

Develop Tools and Analytics Dashboards:

We'll make tools and dashboards for people who manage the system. These tools will help them keep track of data and see how well the system is working. By looking at this information, they can find ways to make fertilizer distribution better and help dealers do their job well.

Establish Laboratory Facilities:

We'll build labs where experts can test soil samples from farmers. These labs will give farmers accurate and fast results about their soil quality. This way, farmers can get advice on how to improve their soil for better crops.

Provide Resources for Farmer Empowerment:

Our aim is to give farmers all the help they need to grow their crops well. We'll provide them with useful information and tips on how to use fertilizers and manage their crops. This will give farmers the knowledge and skills they need to be successful in farming.

Solution Overview

Our comprehensive fertilizer management system offers an innovative solution to address the challenges faced by farmers and stakeholders in the agricultural industry. By leveraging advanced technology and intuitive design, our platform aims to streamline fertilizer distribution processes, enhance communication between stakeholders, and empower farmers with valuable insights and resources.

Key Features:

Efficient Fertilizer Distribution: Our system facilitates efficient and transparent fertilizer distribution by connecting farmers with nearby dealers through an intuitive interface. Farmers can easily browse available products, place orders, and track deliveries in real-time, ensuring timely access to essential agricultural inputs.

Feedback and Community Engagement: We provide a platform for farmers to share feedback and ratings on fertilizer products and dealer services. This fosters a sense of community and continuous improvement within the agricultural ecosystem, enabling farmers to make informed decisions based on peer reviews.

Soil Quality Management: Our system integrates laboratory facilities to offer soil testing services to farmers. Through soil analysis reports, farmers gain valuable insights into their soil's nutrient levels and composition, enabling them to make informed decisions about fertilizer usage and soil management practices.

Administrative Dashboard: Administrators have access to a comprehensive dashboard for monitoring and managing various aspects of the fertilizer management system. This includes tracking dealer feedback, analyzing fertilizer suggestions, and generating reports to inform strategic decision-making.

Data Analytics and Performance Evaluation: System managers can conduct in-depth analysis of fertilizer-related data and dealer performance to identify trends, patterns, and areas for improvement. This data-driven approach enables continuous optimization of the fertilizer distribution process and enhances overall system efficiency.

Benefits:

Enhanced Efficiency: Our system streamlines fertilizer distribution processes, reducing delays and inefficiencies in the supply chain.

Improved Communication: By facilitating feedback and community engagement, our platform enhances communication between farmers, dealers, and administrators.

Informed Decision-Making: Soil testing services provide farmers with valuable insights into soil quality, enabling them to make informed decisions about fertilizer usage and soil management practices.

Data-Driven Insights: Data analytics tools enable administrators to gain actionable insights into fertilizer distribution trends and dealer performance, driving continuous improvement and optimization.

Empowered Farmers: By providing access to resources and knowledge, our platform empowers farmers to optimize fertilizer usage and improve agricultural practices, ultimately leading to increased crop yields and improved livelihoods.

Methodology

Research and Analysis: We'll start by researching existing fertilizer management systems and analyzing the needs of farmers and stakeholders. This involves studying similar projects, understanding user requirements, and identifying challenges in the current agricultural system.

Stakeholder Engagement: Next, we'll engage with farmers, dealers, and other stakeholders to gather insights and feedback. This involves conducting surveys, interviews, and focus groups to understand their preferences, pain points, and expectations from the system.

System Design: Based on the research findings and stakeholder input, we'll design the architecture and features of the fertilizer management system. This includes creating wireframes, mockups, and prototypes to visualize the user interface and functionality.

Development: Once the design is finalized, we'll proceed with the development phase. Using the MERN stack (MongoDB, Express.js, React.js, and Node.js), we'll build the frontend and backend components of the web application. This involves coding the features, integrating APIs, and ensuring compatibility across different devices and browsers.

Testing and Quality Assurance: Throughout the development process, we'll conduct rigorous testing to identify and fix any bugs or issues. This includes unit testing, integration testing, and user acceptance testing to ensure the system meets quality standards and functions smoothly.

Deployment: After thorough testing and validation, we'll deploy the fertilizer management system to a production environment. This involves setting up servers, configuring databases, and deploying the application for public access.

Training and Support: We'll provide training sessions and user guides to farmers, dealers, and administrators on how to use the system effectively. Additionally, we'll offer ongoing support and troubleshooting to address any technical issues or questions that arise post-deployment.

Evaluation and Iteration: Once the system is live, we'll continuously monitor its performance and gather feedback from users. This feedback will be used to make iterative improvements and enhancements to the system, ensuring it remains relevant and valuable to its users over time.

Data Security and Privacy Measures: Ensuring the security and privacy of user data is paramount. We'll implement robust security measures such as encryption, authentication mechanisms, and access controls to safeguard sensitive information. Regular security audits and compliance checks will be conducted to identify and mitigate any potential vulnerabilities.

Documentation and Knowledge Sharing: Creating comprehensive documentation and knowledge-sharing resources is essential for user adoption and system maintenance. We'll develop user manuals, technical guides, and training materials to support users at every stage of their interaction with the system. Additionally, we'll establish a knowledge base and community forums to facilitate peer-to-peer support and knowledge exchange among users.

TOOLS AND TECHNOLOGIES

We are using MERN stack framework for developing our web application. MERN is a set of technologies that work together to build complete web applications. Mongo DB, Express, React JS and Node JS are a set of technologies that are used in it.

M - Mongo DB

E - Express

R - React

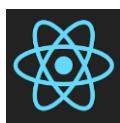
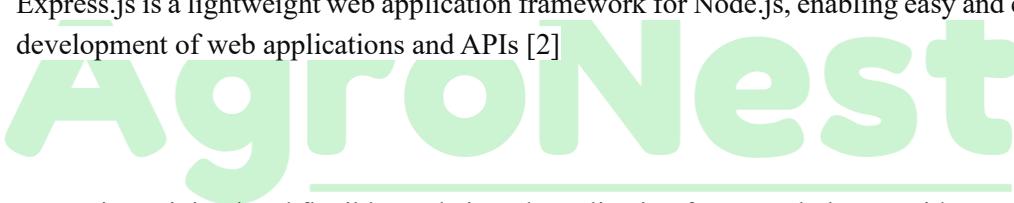
N – Node JS



Mongo DB is a non-SQL database known for its usability and scalability. It is more familiar with agile methodology. widely used in modern applications for its ease of use.[1]



Express.js is a lightweight web application framework for Node.js, enabling easy and efficient development of web applications and APIs [2]



Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications [3]



Node.js is a runtime environment for executing JavaScript code outside of a web browser. It allows developers to build scalable and high-performance applications [4]

The following tools and technologies are being used to continue our project.

Visual Studio Code:

Visual Studio code s is Microsoft IDE, providing tools for coding, debugging, and deploying applications across different platform.[5]

GitHub:

GitHub is a leading platform for version control and collaboration, enabling developers to manage projects, track changes, and work together efficiently using Git [6]

PROJECT REPORT STRUCTURE

SECTION 1:

The first section (Chapter 2) of the report describes the background of the system, requirement analysis, how stakeholders interact with the system, and deliverables expected by the users of the system.

SECTION 2:

Section two (Chapter 3&4) of the report includes Design, Implementation and Testing. Use case diagrams and Activity diagrams to depict the Requirements Analysis. Class diagram, User Interfaces depict the overall design of the system. The implementation describes module structures and test cases used in the system.

SECTION 3:

Section three (Chapter 5) includes references used as support to complete the project report successfully.



CHAPTER - 2

REQUIREMENTS

STAKEHOLDER ANALYSIS

In our stakeholder analysis, we've carefully examined the various individuals and groups involved in the fertilizer management system to understand their roles, needs, and interests. Our primary stakeholders include farmers, dealers, laboratory technicians, company administrators, and system managers. In our stakeholder analysis, we've meticulously examined the diverse actors involved in the fertilizer management system, delving into their specific roles, concerns, and contributions.

Farmers: Farmers are the backbone of our agricultural system and the primary end-users of the fertilizer management system. They rely on the platform to access fertilizers, place orders, and receive valuable guidance on soil management. For farmers, the system's user-friendliness, accessibility, and effectiveness in providing personalized recommendations are paramount. Additionally, they seek a seamless process for soil testing, timely delivery of fertilizers, and a platform to provide feedback on their experiences.

Dealers: Dealers play a pivotal role in the distribution of fertilizers, serving as intermediaries between farmers and fertilizer suppliers. Their responsibilities include managing inventory, processing orders, and ensuring timely delivery to farmers. For dealers, the efficiency of order processing, availability of product information, and ease of communication with farmers are crucial aspects. They also value tools for inventory management, sales tracking, and performance analysis to optimize their operations.

Laboratory: Laboratory technicians are responsible for conducting soil tests and providing accurate analysis reports to farmers and administrators. Their role is essential in helping farmers understand their soil's nutrient levels and make informed decisions about fertilizer usage. Technicians prioritize the accuracy and reliability of test results, efficient sample processing, and clear communication of findings to farmers. They also require tools for managing test requests, scheduling appointments, and maintaining quality control standards.

Company Administrators: Company administrators oversee the overall operation of the fertilizer management system, monitoring feedback, analyzing data, and making strategic decisions. They rely on the system to provide insights into customer satisfaction, dealer performance, and market trends. Administrators prioritize features such as comprehensive dashboards, data visualization tools, and analytics capabilities to track key performance indicators and drive informed decision-making.

System Manager: System manager is responsible for analyzing system data, evaluating performance, and optimizing processes to ensure the system's effectiveness and scalability. They focus on optimizing the system's architecture, improving data management practices, and implementing enhancements based on user feedback and industry best practices. System managers require tools for data analysis, performance monitoring, and system optimization to maintain the system's reliability, efficiency, and relevance over time.

REQUIREMENTS ANALYSIS

Feedback and Inquiry Management:

Functionality: Enable farmers to provide feedback and ratings on dealer services through a user-friendly interface. Implement an inquiry section for farmers to address any concerns or queries related to fertilizer products or services.

Requirements: User interface for feedback submission, rating system implementation, inquiry submission form, backend database for storing feedback and inquiries, notification system for administrators to respond to inquiries.

Order Management:

Functionality: Allow farmers to discover nearby fertilizer dealers, explore available products, place orders, and track delivery status. Support multiple payment options for seamless transactions.

Requirements: Dealer directory with location-based search functionality, product catalog with detailed descriptions, order placement interface, integration with payment gateways, order tracking feature with real-time updates.

Soil Quality Management:

Functionality: Enable farmers to create profiles, request soil tests, and receive personalized recommendations based on soil analysis reports. Facilitate interaction with nearby laboratories for sample collection and analysis scheduling.

Requirements: User registration and profile management system, integration with laboratory databases for scheduling appointments, submission form for soil test requests, dashboard for viewing and managing soil analysis reports, automated recommendations based on test results.

Laboratory Management:

Functionality: Provide laboratories with tools to manage sample collection, conduct soil analysis, and deliver detailed reports to farmers. Streamline the appointment scheduling process and ensure timely and accurate test results.

Requirements: Laboratory registration and profile management system, appointment scheduling interface, sample tracking system, soil analysis tools, report generation and delivery mechanism, quality assurance measures to ensure accuracy and reliability of test results.

Manage Admin Dashboard:

Functionality: Offer administrators a comprehensive dashboard to monitor various aspects of the system, including dealer feedback, fertilizer suggestions, laboratory performance, and analysis reports.

Requirements: Dashboard interface with customizable widgets, data visualization tools, feedback management system, access control mechanisms for different administrator roles, notification system for important updates.

System Data Analysis:

Functionality: Provide system managers with tools for analyzing fertilizer-related data, evaluating dealer performance, and generating periodic reports for strategic decision-making.

Requirements: Data analysis tools with advanced filtering and visualization capabilities, performance metrics tracking system, report generation module with customizable templates, scheduled report delivery mechanism.

Inventory Management:

Functionality: Empower dealers to manage their profiles, update available fertilizer categories, and track orders and inventory status. Streamline payment processing for fertilizer purchases.

Requirements: Dealer profile management interface, inventory management tools with real-time updates, order processing system with payment integration, sales tracking feature, notification system for low inventory levels.

Article and Promotion Management:

Functionality: Allow administrators to publish articles, promotions, and notifications related to agriculture and fertilizer management. Engage users with targeted content and promotional offers.

Requirements: Content management system for article publication, promotion creation interface with scheduling options, targeted distribution mechanisms based on user preferences and demographics, analytics tools for tracking engagement and effectiveness.

In summary, our requirements analysis for the fertilizer management system encompasses eight key functions aimed at addressing the diverse needs of stakeholders across the agricultural value chain. Each function is designed to streamline operations, enhance communication, and empower users with valuable tools and resources for efficient fertilizer management and agricultural productivity. By fulfilling these requirements, our system aims to revolutionize the way stakeholders interact with fertilizer-related processes, ultimately driving sustainable agricultural practices and improving crop yields.

CHAPTER - 3

DESIGNING AND DEVELOPMENT

ONION DIAGRAM

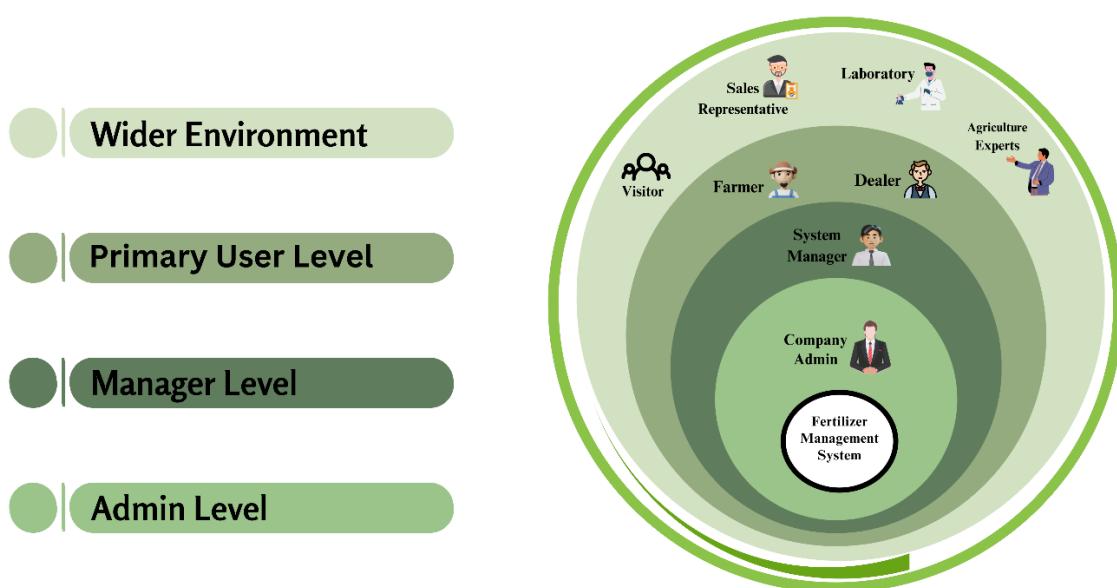
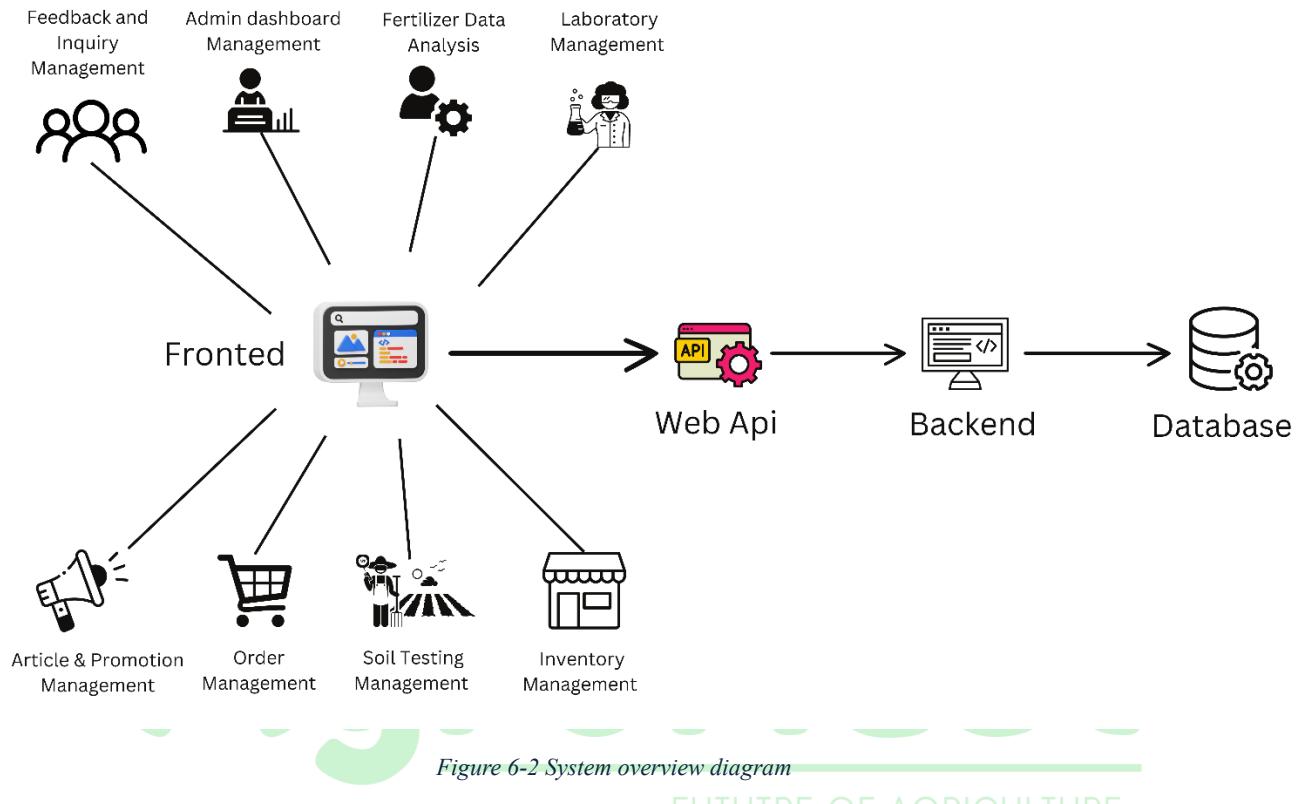


Figure 6-1 Onion diagram

The onion diagram represents the hierarchical structure of stakeholders involved in our fertilizer management system, illustrating the varying degrees of interaction and influence among different user groups. At the core of the diagram lies the Company Admin, representing the central authority responsible for overseeing the entire system's operation and administration. Surrounding the Company Admin is the System Manager layer, tasked with managing system functionalities, data analysis, and performance monitoring. Moving outward, the third layer encompasses Farmers and Dealers, who form the primary user base interacting directly with the system to access fertilizer-related services and resources. Finally, the outermost layer expands to include Visitors, Sales Representatives, and Agriculture Experts, representing external stakeholders who may interact with the system to access information, promotional offers, or expert advice. This layered structure reflects the interconnectedness of stakeholders within the agricultural ecosystem, with each layer playing a crucial role in facilitating efficient fertilizer management and promoting agricultural sustainability.

SYESTEM OVERVIEW DIAGRAM



Our system overview diagram provides a comprehensive look into the architecture and functionality of our web application, meticulously crafted using the MongoDB, Express.js, React.js, and Node.js (MERN stack) technology stack. MongoDB serves as the backbone of our database, housing crucial data such as user profiles, dealer information, fertilizer products, soil test reports, and feedback ratings. Express.js takes charge of API creation, facilitating seamless communication between various components of our system. Meanwhile, React.js empowers our frontend interface with its dynamic capabilities, offering an intuitive user experience for farmers, dealers, laboratories, and administrators alike. Node.js governs the server-side logic, ensuring efficient real-time communication between the client and server.

The application's functionality is bolstered by interconnected APIs and routes, meticulously designed to enable seamless data flow across key features such as Feedback and Ratings, Explore Dealers and Place Orders, Soil Testing Service, and more. Through the strategic integration of modern technology, our application stands poised to revolutionize fertilizer management, equipping users with invaluable insights and resources essential for agricultural success in today's dynamic landscape.

HIGH-LEVEL ARCHITECTURE DIAGRAM

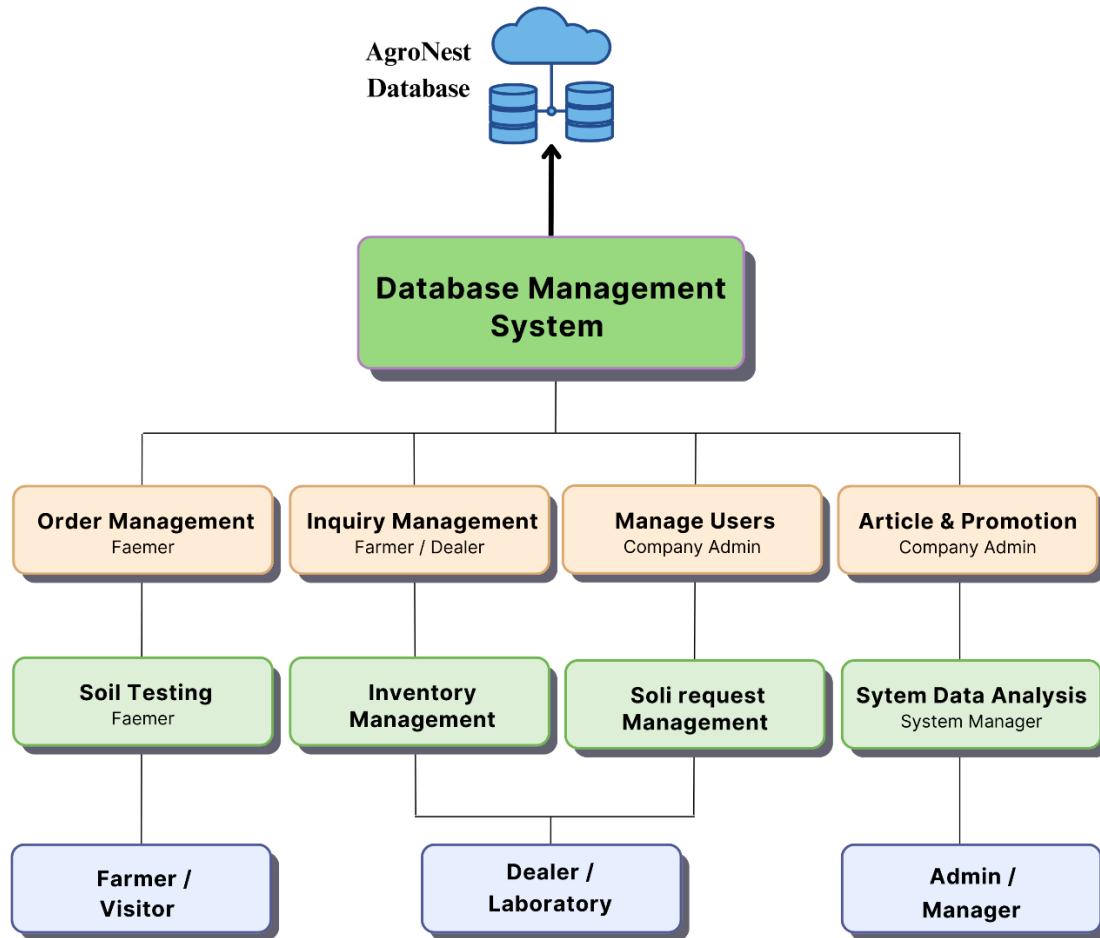


Figure 6-3 high level architecture diagram

The high-level architecture diagram provides an overview of the system's structural framework, delineating the key components and their interconnections. At its core, the diagram depicts the central server or backend system, which serves as the foundation for data storage, processing, and management. Surrounding the backend are various client-side interfaces, including web applications for Farmers, Dealers, Laboratory, and System Admin, each tailored to meet the specific needs and functionalities of different user roles. Additionally, the diagram illustrates the integration of external services such as payment gateways and third-party APIs, facilitating seamless transactions and data exchange between the system and external entities. Overall, the high-level architecture diagram offers a visual representation of the system's overarching design, highlighting the flow of information and interactions between different components to support efficient fertilizer management and stakeholder engagement.

DIAGRAMS OF COMPONENTS

Laboratory Management

The Laboratory Management function is pivotal within our fertilizer management system, representing a proactive approach to address the pervasive issue of farmers employing inappropriate fertilizers. Its inception stems from the recognition of a fundamental need to streamline soil testing processes while empowering farmers to make informed decisions regarding fertilizer selection. At its helm stands the soil testing lab, the cornerstone actor entrusted with delivering accurate soil health assessments, nuanced nutrient level analyses, and personalized fertilizer recommendations tailored to each farmer's specific needs and soil conditions.

Functionality within Laboratory Management begins with Lab Registration, an essential step enabling testing labs to seamlessly integrate into our system by providing precise location details and accessing a dedicated dashboard for managing appointments and test reports. Appointment Management emerges as a critical feature, affording labs the ability to efficiently prioritize and schedule tests, optimizing resource allocation and workflow efficiency. Confirmation of Appointments further enhances transparency and accountability, ensuring farmers receive timely notifications and updates regarding their scheduled tests, thereby fostering trust and confidence in the process.

Sample Collection Scheduling represents a significant advancement in user experience, empowering farmers to select convenient dates and time slots for submitting soil samples, thereby facilitating a seamless and collaborative workflow between farmers and testing labs. As samples are processed, Soil Analysis and Reporting emerge as the crux of Laboratory Management, with labs employing rigorous analytical methodologies to generate comprehensive reports encompassing soil health assessments, nutrient profiles, and targeted fertilizer recommendations.

These reports, meticulously compiled by lab assistants, serve as invaluable resources for farmers, offering actionable insights and guidance to optimize soil fertility and crop productivity. The secure and streamlined delivery mechanism ensures farmers receive their reports promptly through the system, facilitating informed decision-making and promoting sustainable agricultural practices.

In essence, the Laboratory Management function embodies a symbiotic relationship between technology and agriculture, bridging the gap between farmers and testing labs to foster collaboration, facilitate knowledge exchange, and ultimately enhance agricultural productivity and sustainability. Through its multifaceted approach, Laboratory Management strives to revolutionize soil testing processes, empower farmers with actionable insights, and mitigate the misuse of fertilizers, thereby contributing to the advancement of modern agricultural practices.

Use case diagram of laboratory management.

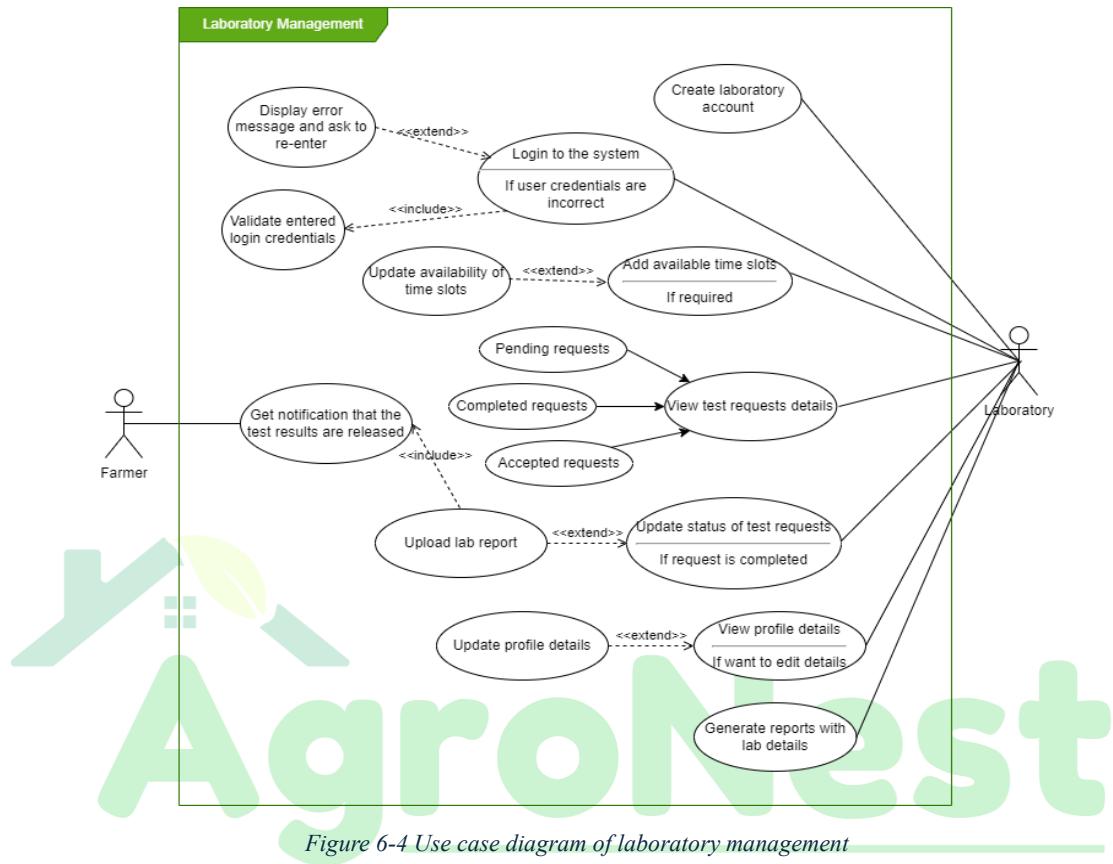


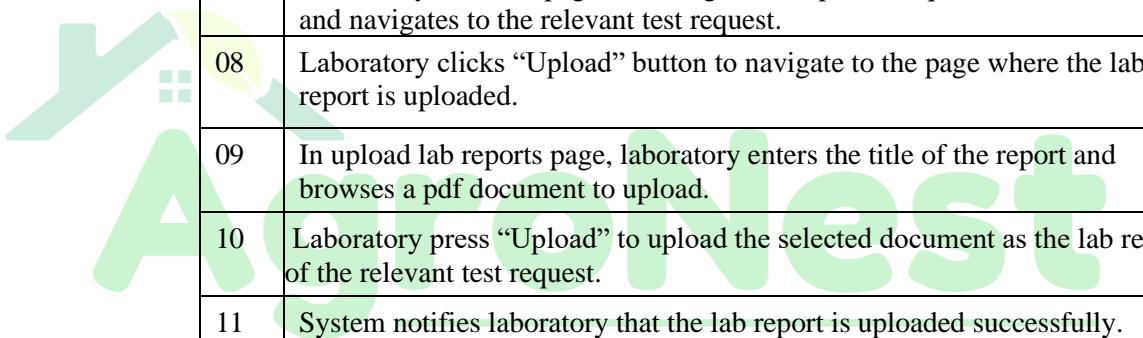
Figure 6-4 Use case diagram of laboratory management

FUTUTURE OF AGRICULTURE.

Use Case Scenario of laboratory management.

Table 6.1 Laboratory management use case scenario

Number	04
Name	Handle soil test requests.
Summary	Handle the soil test requests sent by the farmers and send the lab reports once the tests are completed.
Priority	7
Pre-conditions	Lab assistant has logged into the system and has the intention of handling the available requests.
Post-conditions	Report about the quality of the soil is sent to the relevant farmer.
Primary Actor	Laboratory
Secondary Actor	Farmer

Trigger	Laboratory checks the test requests directed to them.	
Main Scenario	Steps	Action
	01	Laboratory accesses the system and view “pending requests” section.
	02	System displays the available pending requests with details, and also the number of new requests from the time that the laboratory last logged in.
	03	Laboratory selects “Accepted” from the status dropdown of the relevant test request.
	04	System changes the status of the selected request to accepted and moves the request to the “accepted requests” page.
	05	After the test is done manually, laboratory navigates to accepted requests page and changes the status of the test request to “Completed” from the status dropdown.
	06	System will update the relevant test request status as “Completed” and transfer the request to “completed requests” page.
	07	Laboratory view the page including the completed requests for the moment and navigates to the relevant test request.
	08	Laboratory clicks “Upload” button to navigate to the page where the lab report is uploaded.
	09	In upload lab reports page, laboratory enters the title of the report and browses a pdf document to upload.
	10	Laboratory press “Upload” to upload the selected document as the lab report of the relevant test request.
	11	System notifies laboratory that the lab report is uploaded successfully.
	12	Laboratory will be redirected to the completed requests page after successfully submitting the lab report.
Extension	Steps	Branching Action
	10a	If laboratory wants to view the uploaded lab report, it will be opened in a new tab once clicked on the selected document.
	10b	When selecting a wrong lab report, laboratory can remove the selected report by clicking “Remove”
	11a	If the title of the lab report is not entered in the relevant text field, system will notify the laboratory that the title field is empty.
	11b	If laboratory has not selected a file to upload, system will display a message to select a file before uploading.
Open issues		Ensuring the confidentiality and integrity of data during the transmission of lab reports is important but the system currently does not have strong security for lab reports transmission. Is it needed to implement this feature?

Activity Diagram of laboratory management

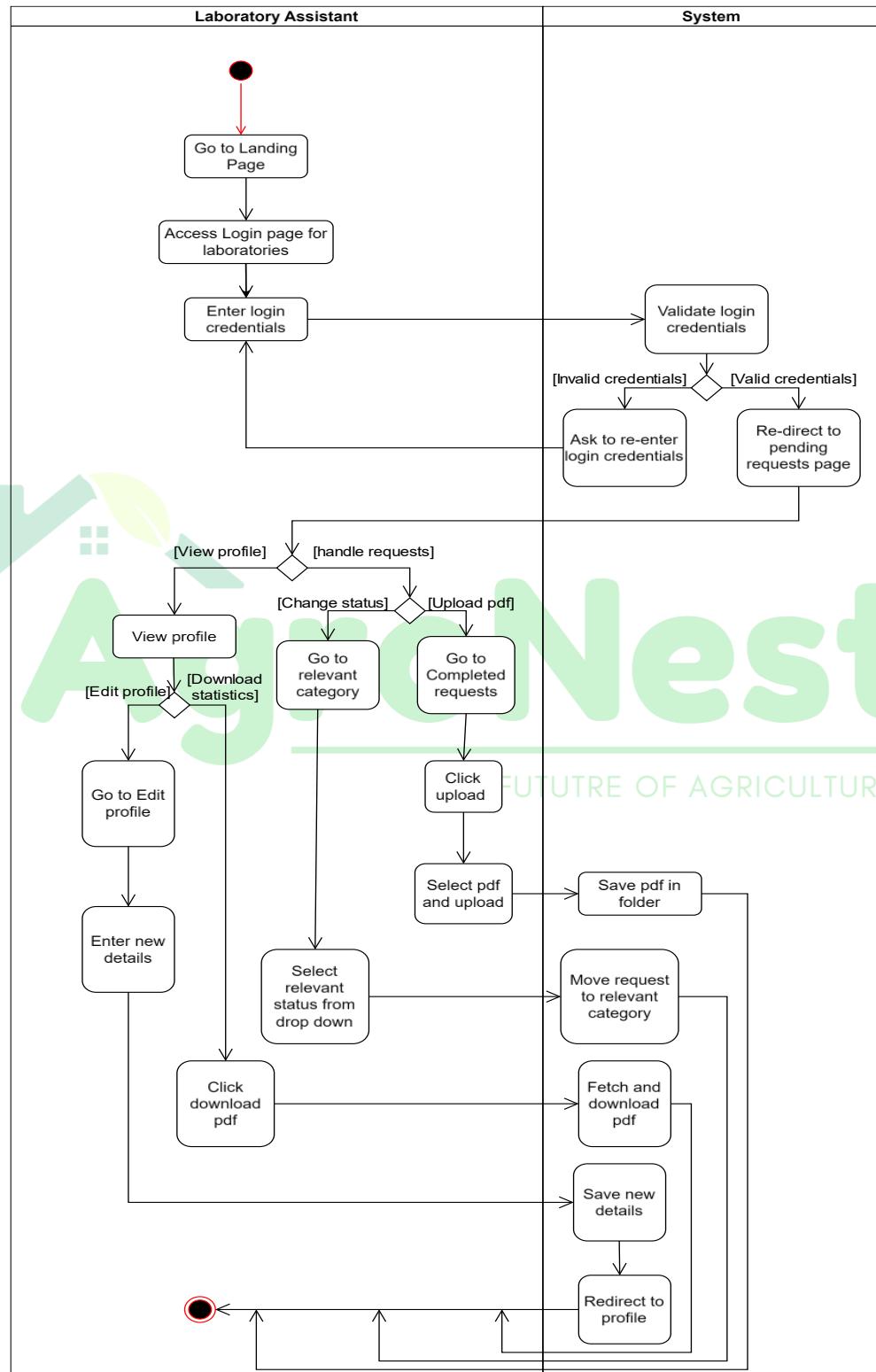


Figure 6-5 Activity Diagram of laboratory management.

Sequence diagram of laboratory management

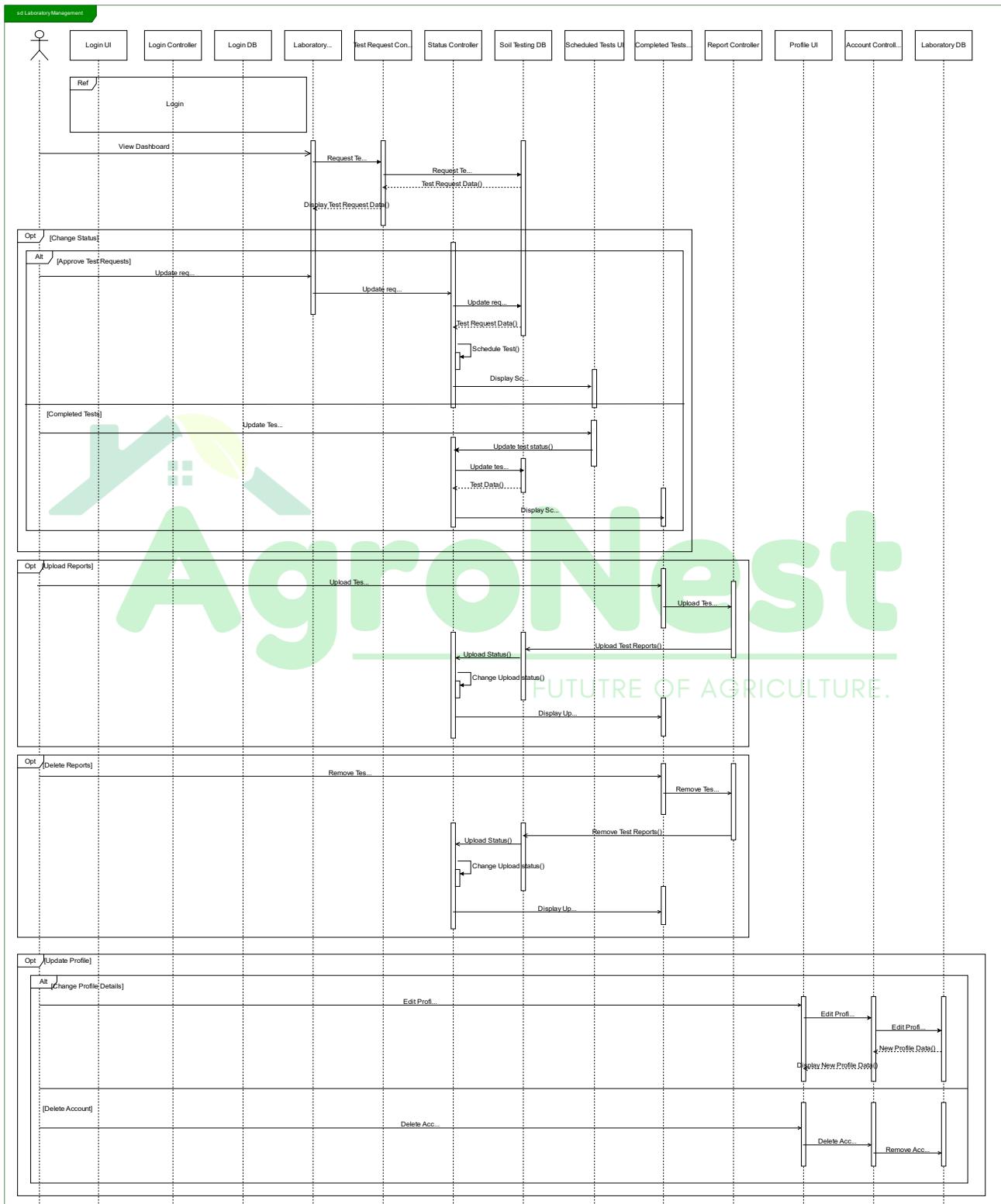


Figure 6-6 Sequence diagram of laboratory management

Soil Quality Management

The Farmer Profile and Soil Quality Management function is a pivotal component of our AgroNest Fertilizer Management System, designed to cater to the diverse needs of modern farmers and optimize soil health for improved agricultural outcomes. This multifaceted feature encompasses a range of capabilities aimed at empowering farmers and facilitating informed decision-making.

Upon registration and login, farmers are greeted with a user-friendly dashboard, providing easy access to various functionalities within the system. Here, they can seamlessly update their profiles, ensuring that their personal information remains current and accurate. This aspect of the function enhances user engagement and ensures that farmers can effectively utilize the platform to its fullest potential.

One of the standout features of this function is its ability to enable farmers to request soil test services directly through the platform. This streamlined process allows farmers to specify various parameters, including the type of test, crop type, and sample handover date. Furthermore, farmers have the flexibility to filter laboratories based on geographic location, ensuring convenience and accessibility.

Throughout the soil testing process, the system acts as a facilitator, coordinating communication between farmers and testing facilities. Farmers can easily track the status of their test requests, from submission to resolution, providing them with transparency and peace of mind. In instances where adjustments to test details are necessary, farmers can modify or delete request information during the pending stage, thereby ensuring the accuracy and relevance of the testing process.

Once soil tests are completed, farmers can conveniently access and review the results through the platform. The comprehensive soil test reports generated by testing laboratories provide valuable insights into soil health, nutrient levels, and recommendations for fertilizer usage. Armed with this information, farmers can make informed decisions regarding fertilizer selection and application, ultimately enhancing crop yields and promoting sustainable farming practices.

In summary, the Farmer Profile and Soil Quality Management function serves as a cornerstone of our system, offering farmers a robust and user-centric platform to manage profiles, request soil tests, and optimize agricultural practices. By integrating advanced functionalities with intuitive design, this feature empowers farmers to harness the full potential of their land while promoting sustainable farming practices for future generations.

Use case diagram of Soil Quality Management

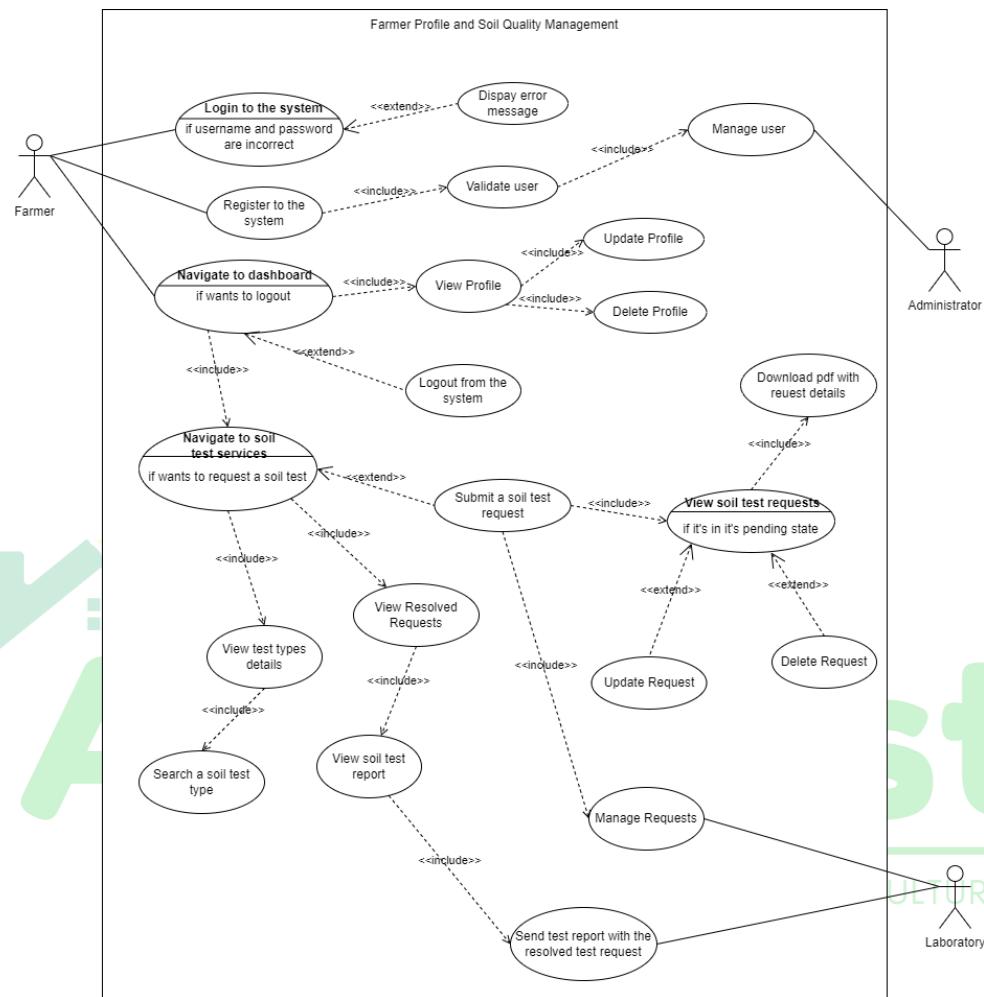


Figure 6-7 Use case diagram of Soil Quality Management

Use Case Scenario of Soil Quality Management

Table 6.2 Use case scenario of Soil Quality Management

Number	03
Name	Farmer Profile and Soil Quality Management
Summary	Demand laboratory facilities to check the quality of the soil and receive test result, so farmers can initiate soil test request.
Priority	7
Pre-conditions	Farmer has logged into the system and has the intention of initiate a soil test request.

	Farmer has navigated to the soil test request section of the platform.	
Post-conditions	Test report about the quality of the soil and the recommendations are sent to the farmer in the resolved request section.	
Primary Actor	Farmer	
Secondary Actor	Laboratory	
Trigger	Farmer selects the option to create a request for soil test request.	
Main Scenario	Steps	Action
	01	Farmer log into the system with valid credentials.
	02	Farmer navigates to Soil Test Services section.
	03	Farmer click on the “Request for a soil test” button and navigate to the request form.
	04	Fill the required fields of the soil test request form and then select the preferred district and city to check the laboratories available in that area.
	05	Farmer submits the request of the soil test after filling the form.
	06	System sends the request to the relevant laboratory to process.
	07	Farmer can update the details entered for the request or remove the request when the request is in its pending state if necessary.
	08	Laboratory conducts soil quality analysis test for the sample provided by the farmer and generates the report.
	09	After the laboratory completed the test farmer can view the request details in the Resolved requests” section.
	10	Farmer can view the test report and the recommendations via the system.
Extension	Steps	Branching Action
	2a	If farmer needs to get an idea about the test types performed by the laboratories, he can navigate to “soil test types” section and search for test types and get the information about different test types.
	6a	If the request is already approved by the laboratory, system change the request status to approved.
	6b	System cancels the request if laboratory rejected to perform the soil test.
	9a	Farmer can view and download the test report easily through the system.

Open issues		Accessing the system's scalability and performance to accommodate potential increases in user traffic and soil test requests over time, particularly during peak agricultural seasons.
		Ensuring that the platform is accessible and user-friendly for farmers to provide the services efficiently.

Activity Diagram of Soil Quality Management

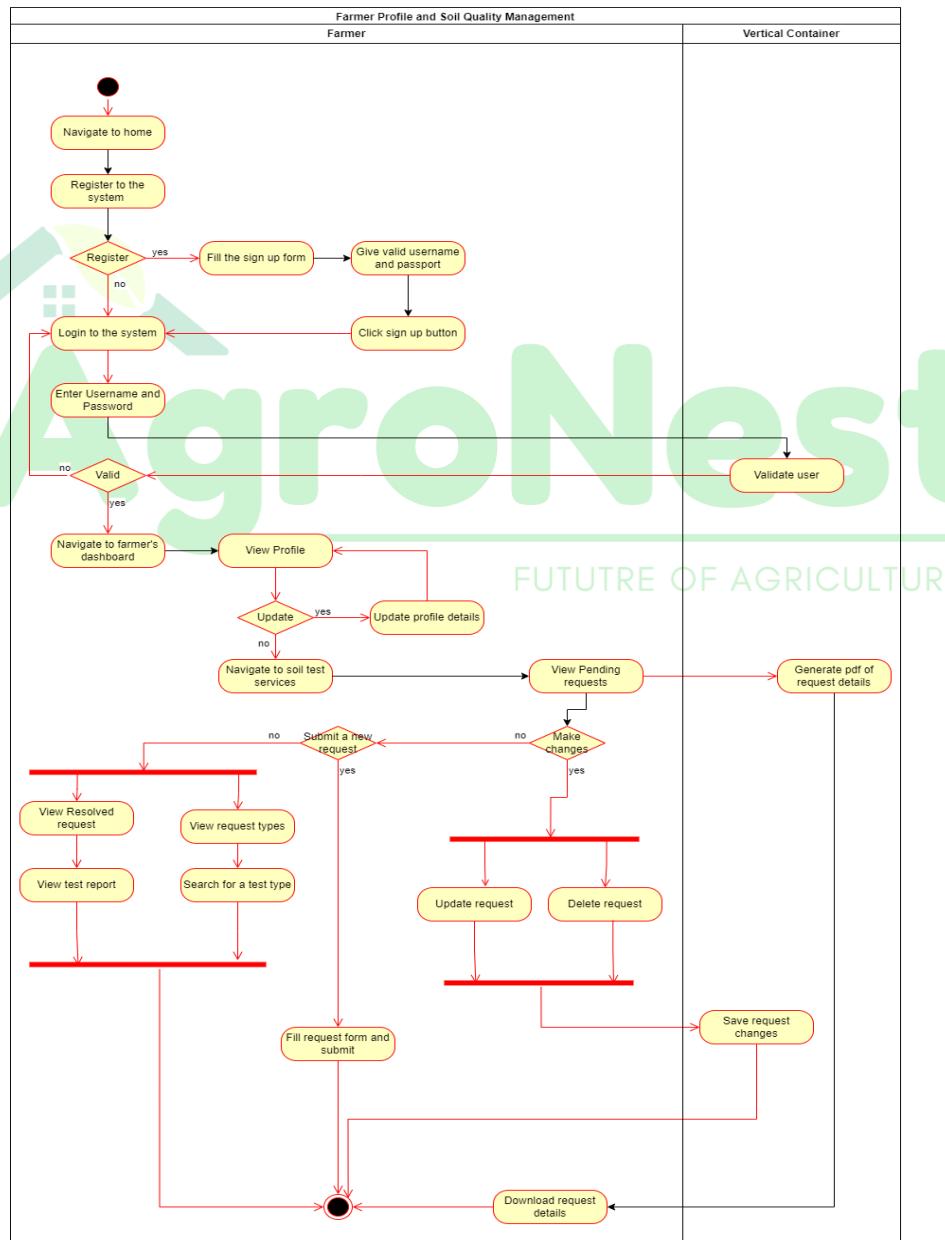


Figure 6-8 Activity Diagram of Soil Quality Management

Sequence diagram of Soil Quality Management

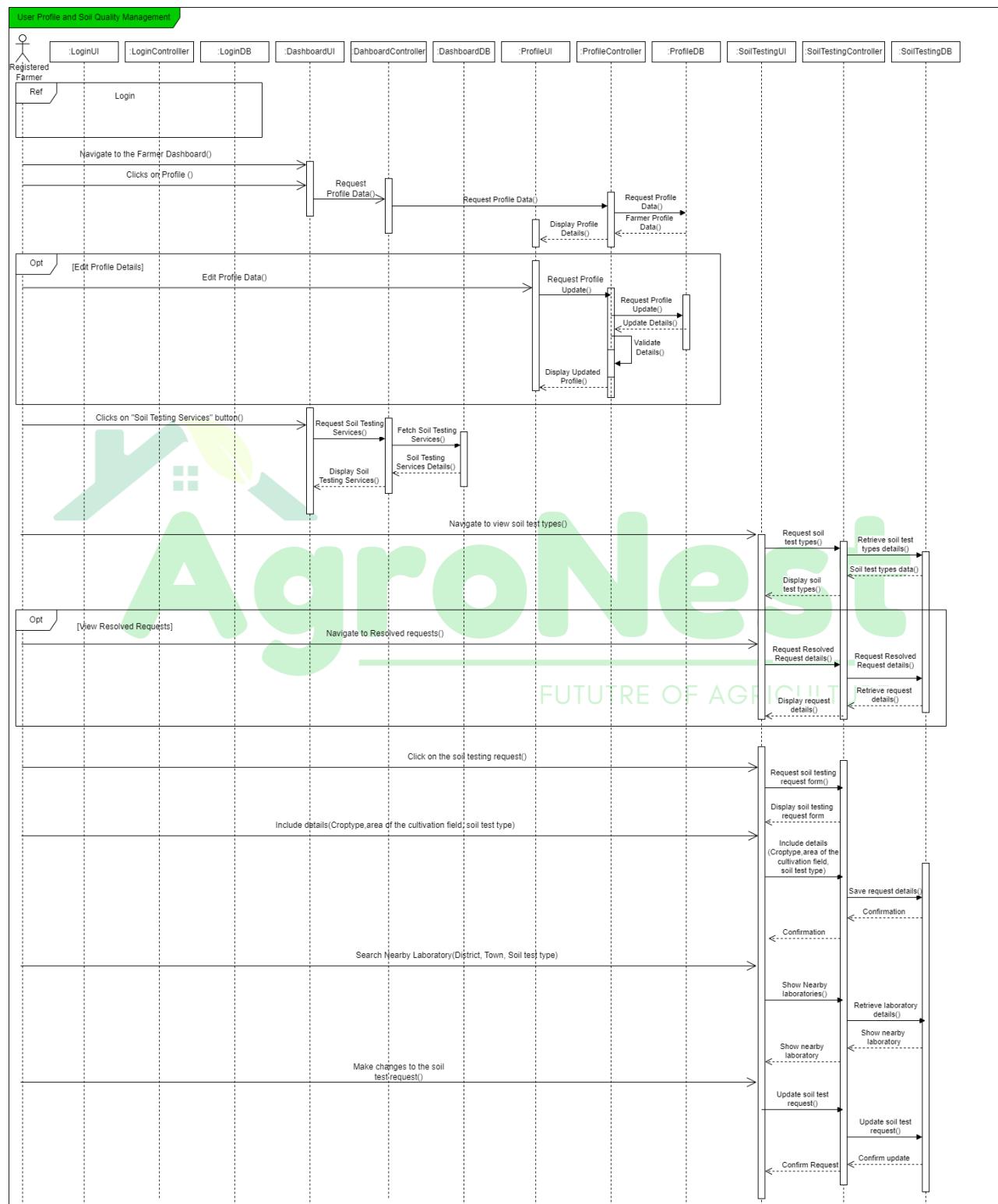


Figure 6-9 Sequence diagram of Soil Quality Management

System Data Analysis

The System Data Analysis function, led by the System Manager, plays a pivotal role in our fertilizer management system by offering comprehensive insights into fertilizer-related data. This function is instrumental in guiding strategic decision-making processes, particularly concerning dealer performance, fertilizer categories, and local market dynamics. The System Manager oversees the analytical process, meticulously examining various indicators to produce informative results that drive organizational growth and efficiency.

Dealer Performance Analysis is a critical aspect of this function, focusing on evaluating the performance of dealers across different categories. By analyzing metrics such as sales volume, customer feedback, and order fulfillment efficiency, the System Manager identifies top-performing dealers and areas for improvement. This analysis not only acknowledges outstanding performance but also incentivizes dealers to strive for excellence, ultimately enhancing overall service quality.

In addition to evaluating dealer performance, the Fertilizer Category Performance review process delves into analyzing sales data, client feedback, and market demand to assess the efficacy of various fertilizer types. By identifying trends, preferences, and opportunities for enhancement, this analysis informs marketing campaigns and inventory management strategies, ensuring optimal allocation of resources and product offerings.

Regional analysis forms another integral component of the Fertilizer Analysis function, leveraging geographic data to identify areas with high dealer registration and customer engagement. Insights gleaned from this analysis inform decisions related to distribution networks, customer support initiatives, and targeted marketing efforts. By prioritizing regions with high dealer registration rates, the organization can develop tailored strategies for market penetration and business expansion.

Regularly generated reports, comprising detailed summaries and visual aids like graphs and charts, serve as invaluable resources for corporate administrators to monitor performance trends and make informed decisions. Additionally, prominently featuring details about top-performing dealers on the platform's main page fosters healthy competition and incentivizes excellence within the dealer network, ultimately contributing to overall service improvement and customer satisfaction. In essence, the Fertilizer Analysis function enables the organization to enhance dealer performance, optimize fertilizer category management, and strategically expand market share through systematic analysis and insightful reporting.

Use case diagram of System Data Analysis

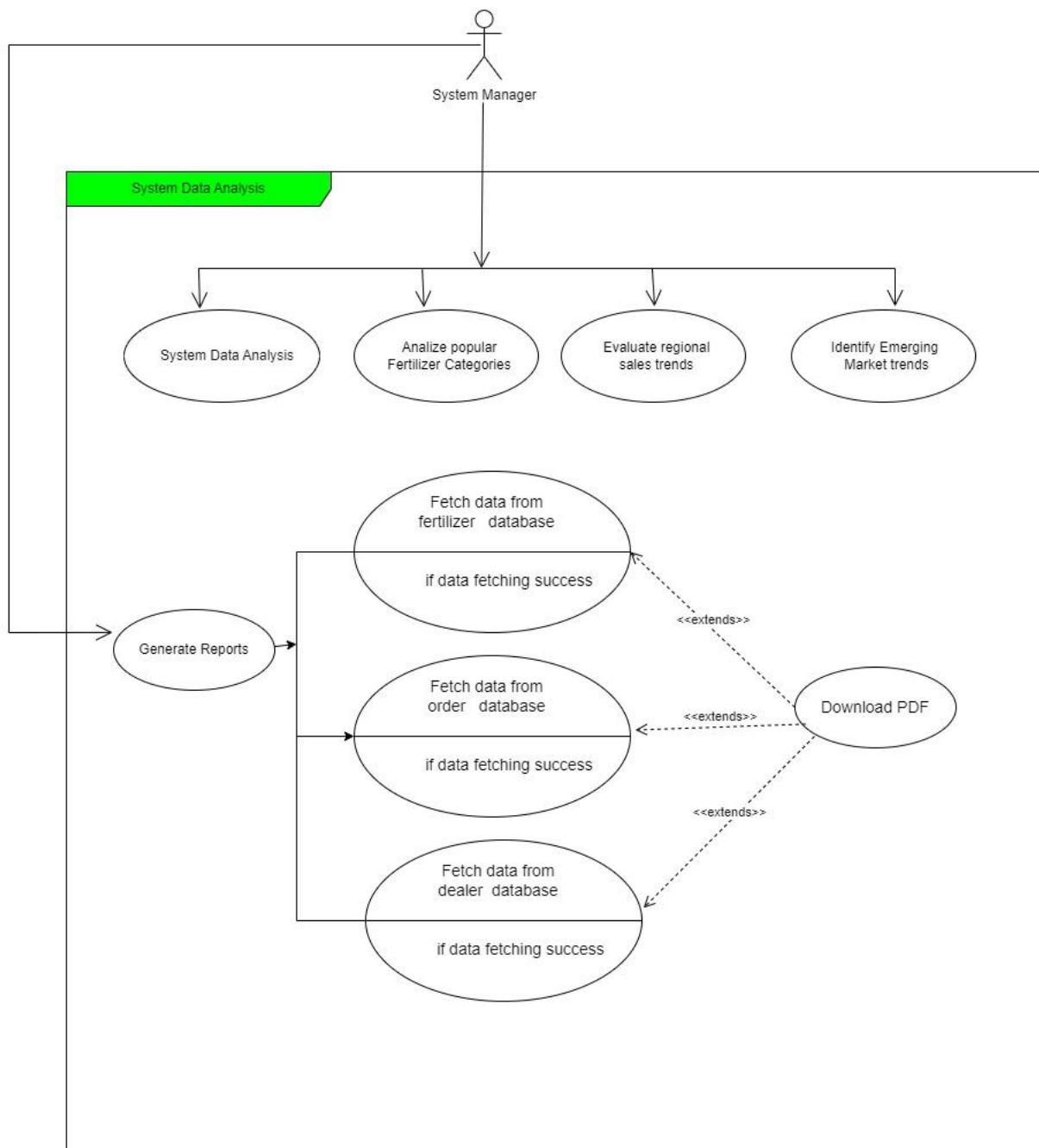


Figure 6-10 Use case diagram of System Data Analysis

Use case scenario of System Data Analysis

Table 6.3 Use case scenario of System Data Analysis

Number	06	
Name	SystemData Analysis	
Summary	Analyzes data to determine top-performing dealers and fertilizer categories.	
Priority	4	
Pre-conditions	The system has access to relevant data on fertilizer sales and user feedback.	
Post-conditions	System generates reports on top-performing dealers and fertilizer categories	
Primary Actor	System Manager	
Trigger	The System Manager initiates the process to add a new report	
Main Scenario	Steps	Action
	01	System Manager accesses the system analytics dashboard.
	02	System displays data on fertilizer sales, user feedback, and dealer performance.
	03	System Manager generates reports on top-performing dealers based on sales volume.
	04	System Manager identifies fertilizer categories with the highest demand.
	05	The System Manager presents the reports to stakeholders for review and decision-making. Stakeholders utilize the reports to make informed decisions on marketing strategies and inventory management.
	06	System Manager archives the generated reports for future reference.
	07	System Manager monitors ongoing trends and updates reports as necessary
Extension	Steps	Branching Action
	4a	If certain fertilizer categories show a decline in sales, the system Manager investigates potential factors and recommends corrective actions.
Open issues		Data accuracy and integrity may be compromised due to incomplete or outdated information in the system.

Activity Diagram of System Data Analysis

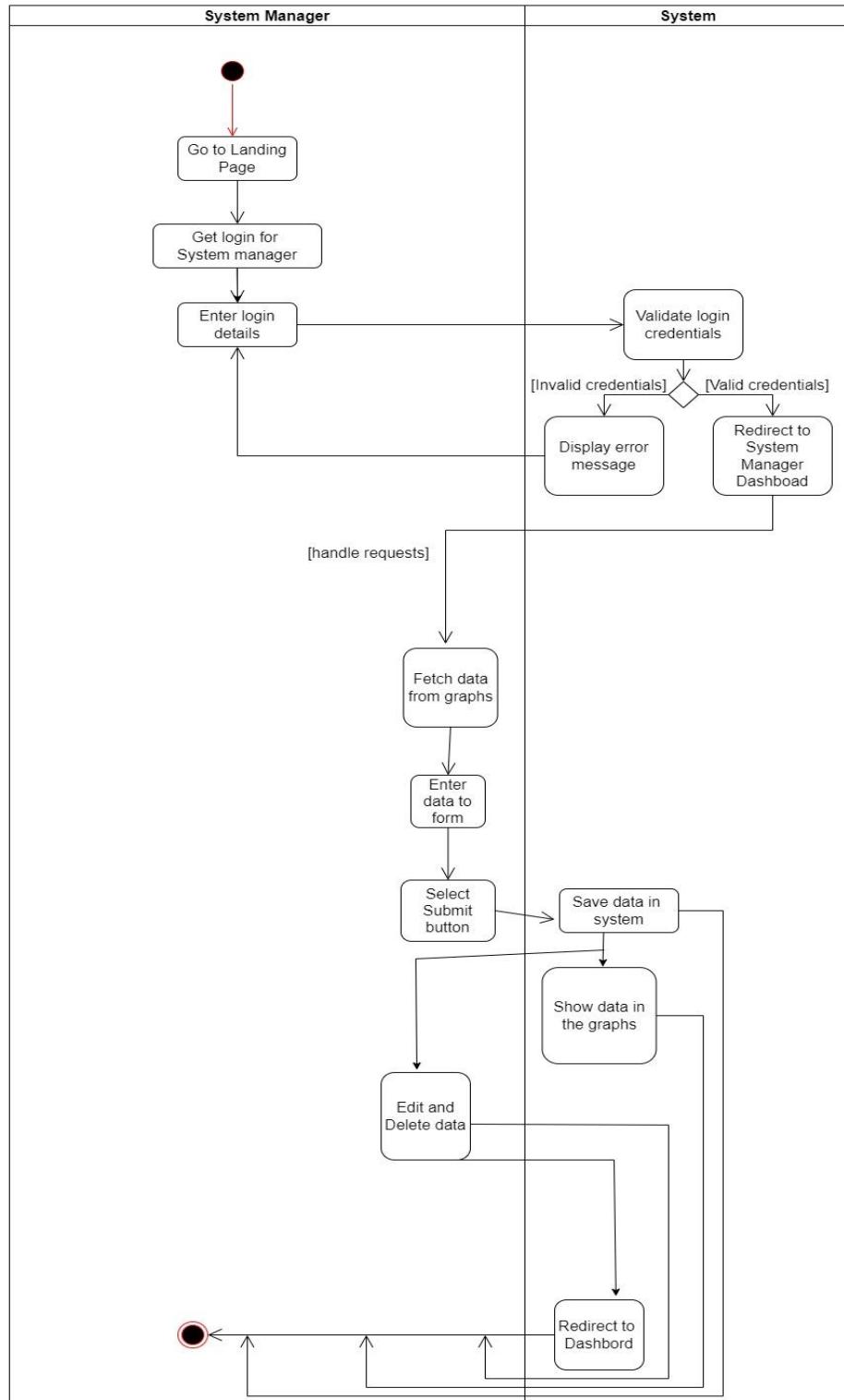


Figure 6-11 Activity Diagram of System Data Analysis

Sequence diagram of System Data Analysis

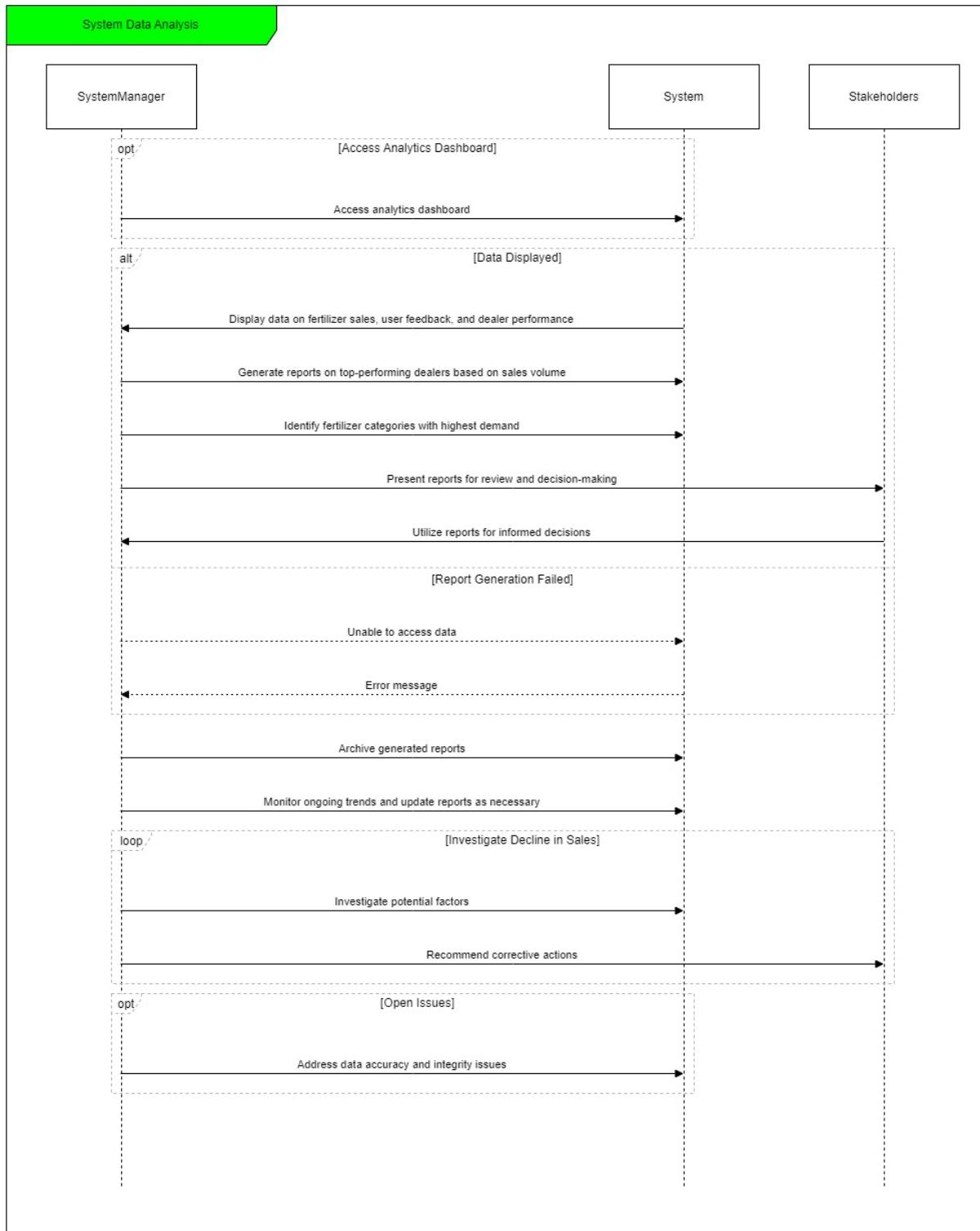


Figure 6-12 Sequence diagram of System Data Analysis

Fertilizer Inventory Management

The main purpose of this function is to revolutionize fertilizer inventory management for dealers through a comprehensive and user-friendly system. The process begins with registration and login functionalities, ensuring secure access to the system's features. Once logged in, dealers can efficiently manage their profiles, ensuring that their information is accurate and up to date. The heart of the system lies in its inventory management capabilities, divided into three key sections.

In the first section, dealers can add new fertilizers to their inventory. They input essential details such as the fertilizer's name, price, item code, and quantity. To maintain data integrity, the system prohibits duplicate entries with identical names and item codes. This ensures that the inventory remains organized and accurate. The second section allows dealers to view all the fertilizers in their inventory briefly, providing comprehensive details to give them a clear overview of their current stock.

The third section is for dealers to make necessary adjustments to their inventory. They can update quantities or prices of existing fertilizers or delete unwanted entries altogether. With each modification, the page refreshes automatically, ensuring that dealers have access to real-time updates. Beyond basic inventory management, the system offers robust analytical capabilities to support dealers in their decision-making processes.

Dealers can search for specific fertilizers and download the search results as a PDF, facilitating efficient data retrieval and offline access. Visual aids such as bar chart visualizations provide dealers with a quick understanding of stocks. Detailed data tables offer a deeper analysis of inventory, and dealers can download PDFs containing comprehensive information on all fertilizers for further reference.

practically, this system offers significant benefits to dealers. It streamlines inventory management processes, saving time and effort in manual record-keeping and analysis. By preventing duplicate entries and facilitating real-time updates, the system ensures data accuracy, reducing errors and discrepancies. The visualization tools and detailed data tables provide valuable insights into inventory status, empowering dealers to make informed decisions regarding stock levels, pricing, and purchasing. Overall, this project provides a robust solution to the challenges of fertilizer inventory management, enabling dealers to optimize their operations and drive business success.

Use case diagram of Fertilizer Inventory Management

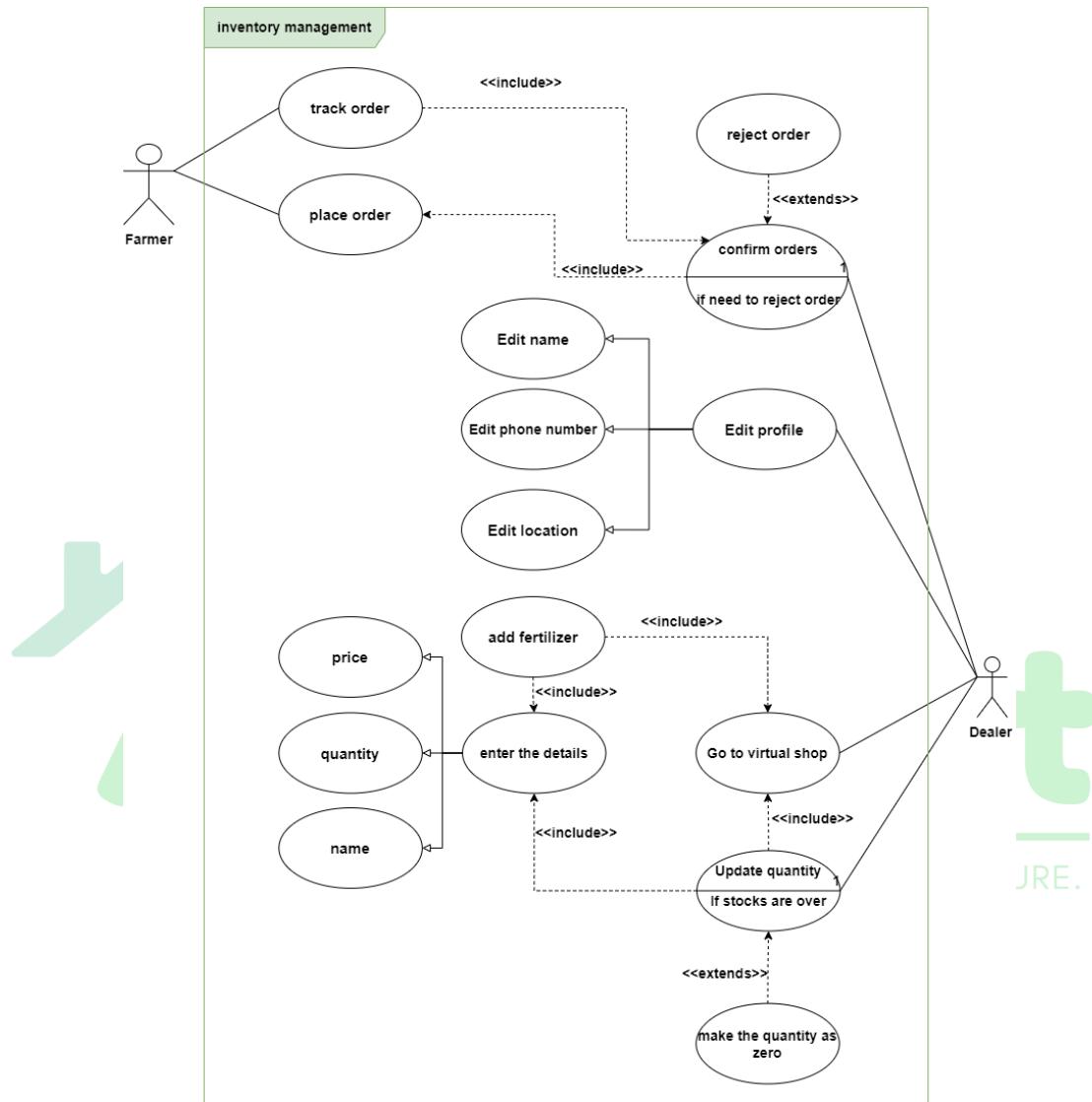


Figure 6-13 Use case diagram of Fertilizer Inventory Management

Use case scenario of Fertilizer Inventory Management

Table 6.4 Use case scenario of Fertilizer Inventory Management

Number	07
Name	Manage fertilizers in the virtual shop
Summary	Add/ update/remove fertilizers in the shop which are available in the stocks. Then the farmers can search and buy them

Priority	2	
Pre-conditions	Log in to the site and go to the virtual shop	
Post-conditions	After managing the shop, log out from the site and receive orders	
Primary Actor	Fertilizer dealer	
Trigger	The dealer wants to manage fertilizers to the shop	
Main Scenario	Steps	Actions
	01	The dealer logs in to the fertilizer management system
	02	Navigates to the virtual fertilizer shop
	03	If the dealer needs to add fertilizers, go to fertilizer adding section.
	04	Fill the required information and save the details.
	05	If the dealer needs to update fertilizers, go to fertilizer update section and choose listings to update.
	06	Update the listings with new quantities or prices.
	07	If the dealer needs to delete fertilizers, go to fertilizer delete section and choose listings to delete.
	08	Delete unwanted listings.
	07	Exit from the shop
	08	Log out from the system
Extension	Steps	Branching Action
	1a	If login credential is incorrect, system will display an error message
	1b	System asks to re-login
	4a	If a fertilizer is existing with the new name, show an error displaying fertilizer is already in the shop.
	4b	If the quantity, item code or price is zero or a positive number, show an error.
	6a	If the quantity, item code or price is zero or a positive number, show an error.
Open issues	1	Currently, there is no automated notification system in place to alert the fertilizer dealer when certain fertilizers are running low in stock. Adding this feature would help the dealer to proactively manage inventory and avoid stockouts, ensuring a smoother purchasing experience for farmers.
	2	The current system lacks advanced data analytics capabilities for analyzing sales trends and forecasting future demand for fertilizers.

Activity Diagram of Fertilizer Inventory Management

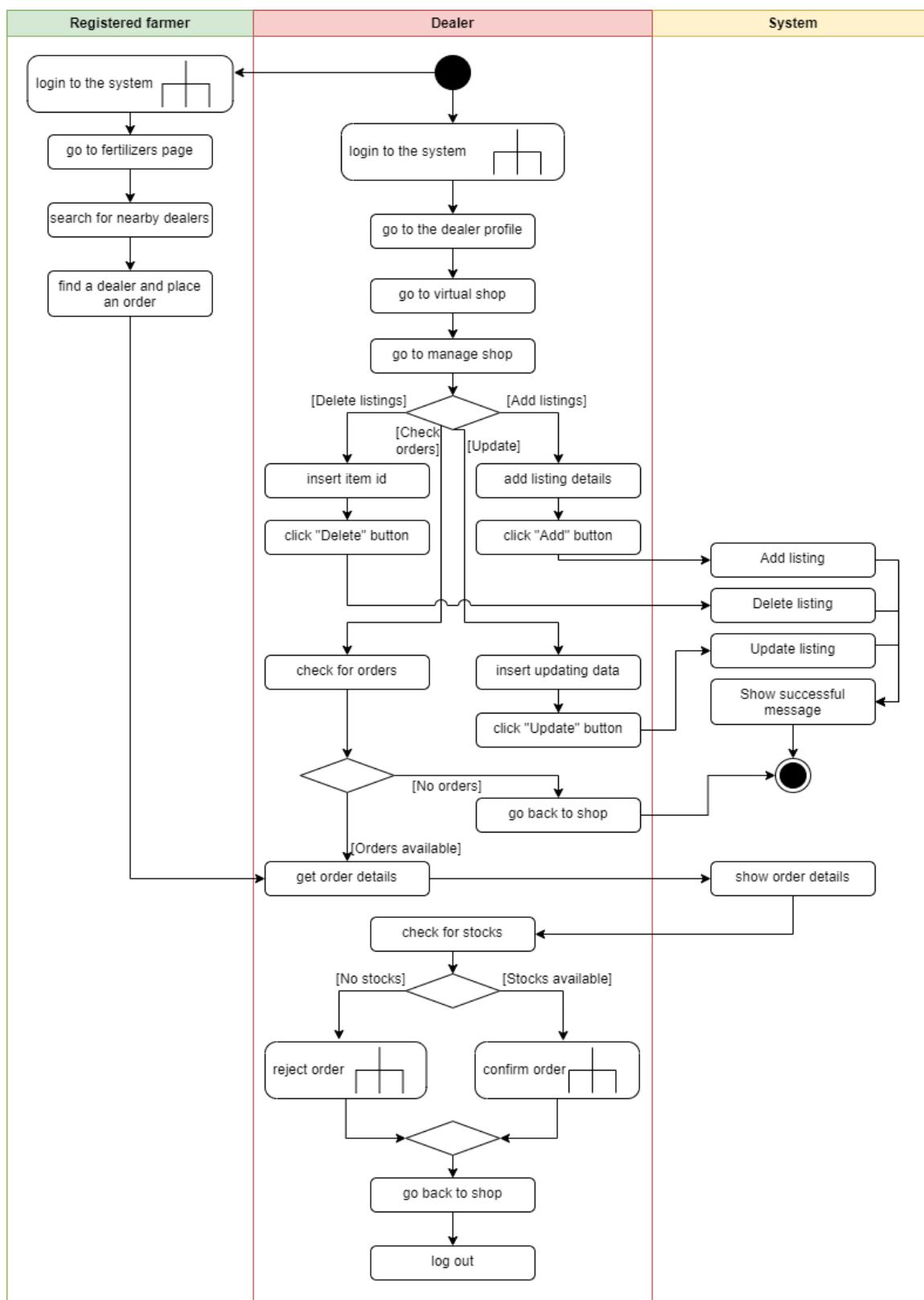


Figure 6-14 Activity Diagram of Fertilizer Inventory Management

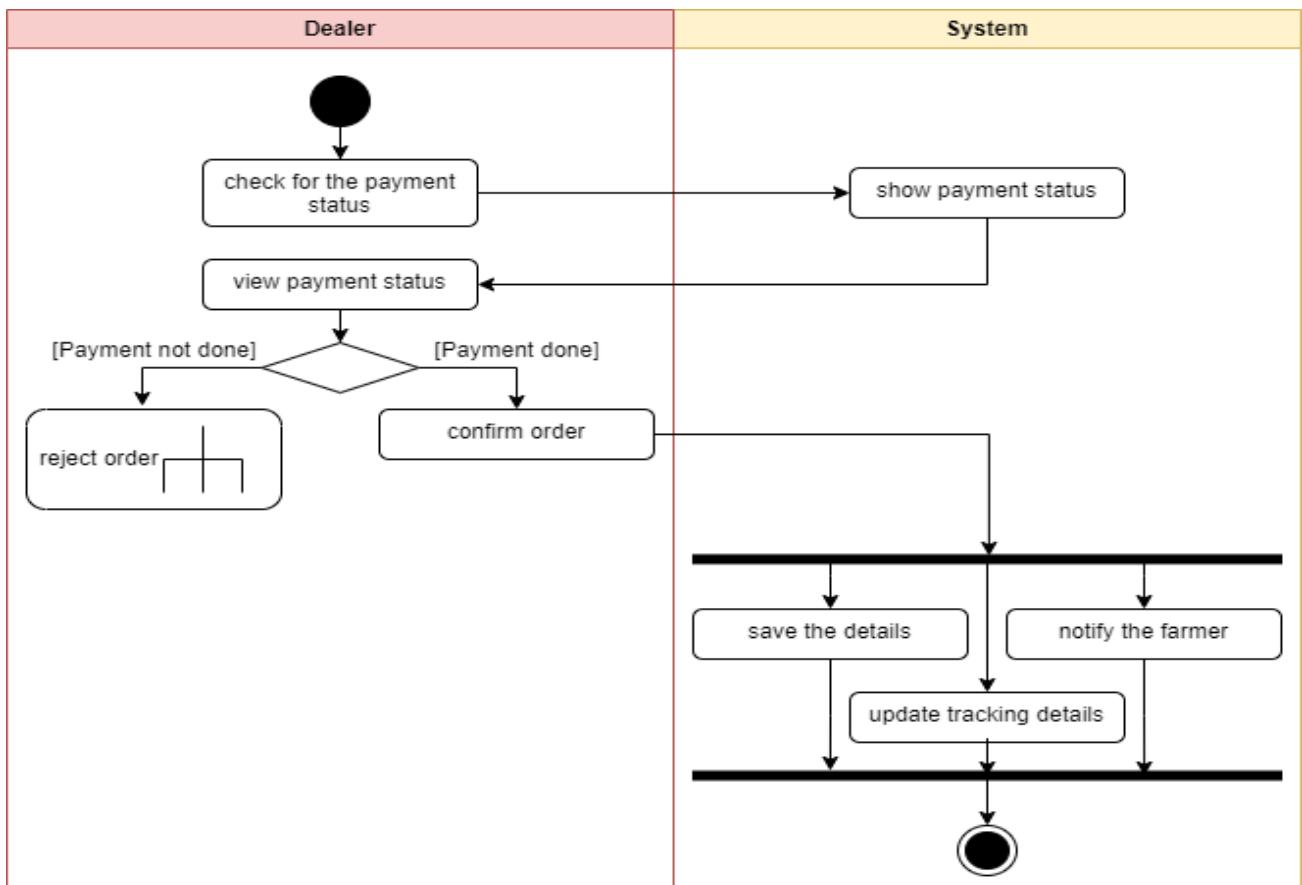


Figure 6-15 Activity Diagram of Fertilizer Inventory Management component.

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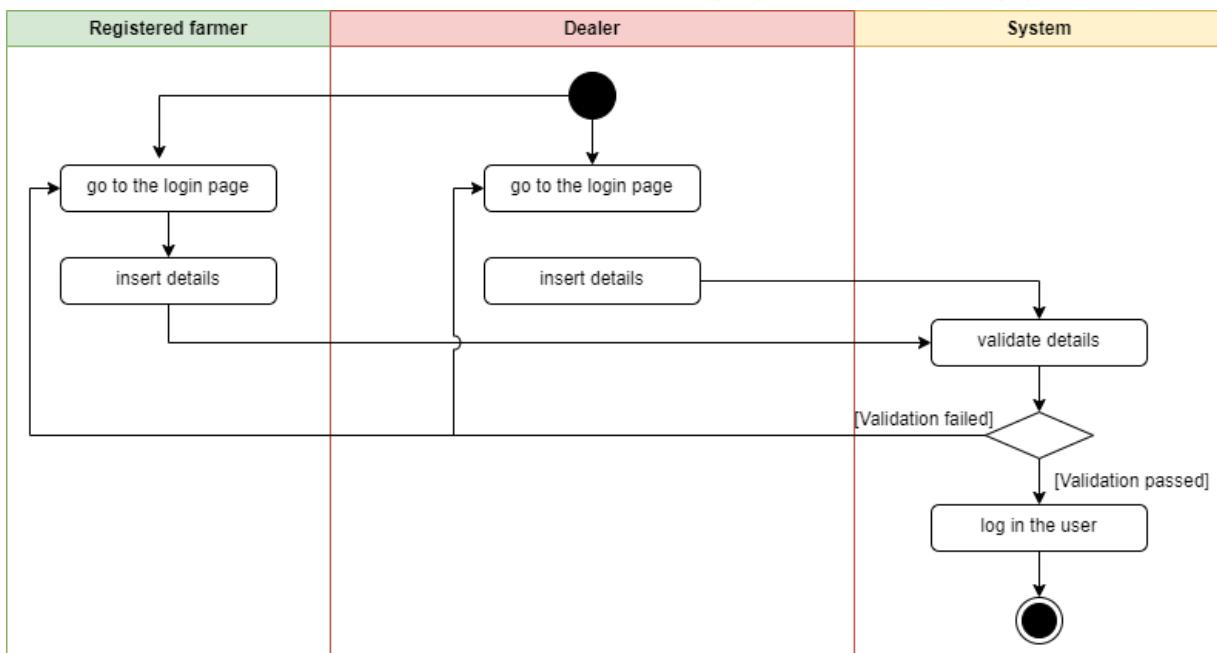


Figure 6-16 Activity Diagram of Fertilizer Inventory Management component

Sequence diagram of Fertilizer Inventory Management

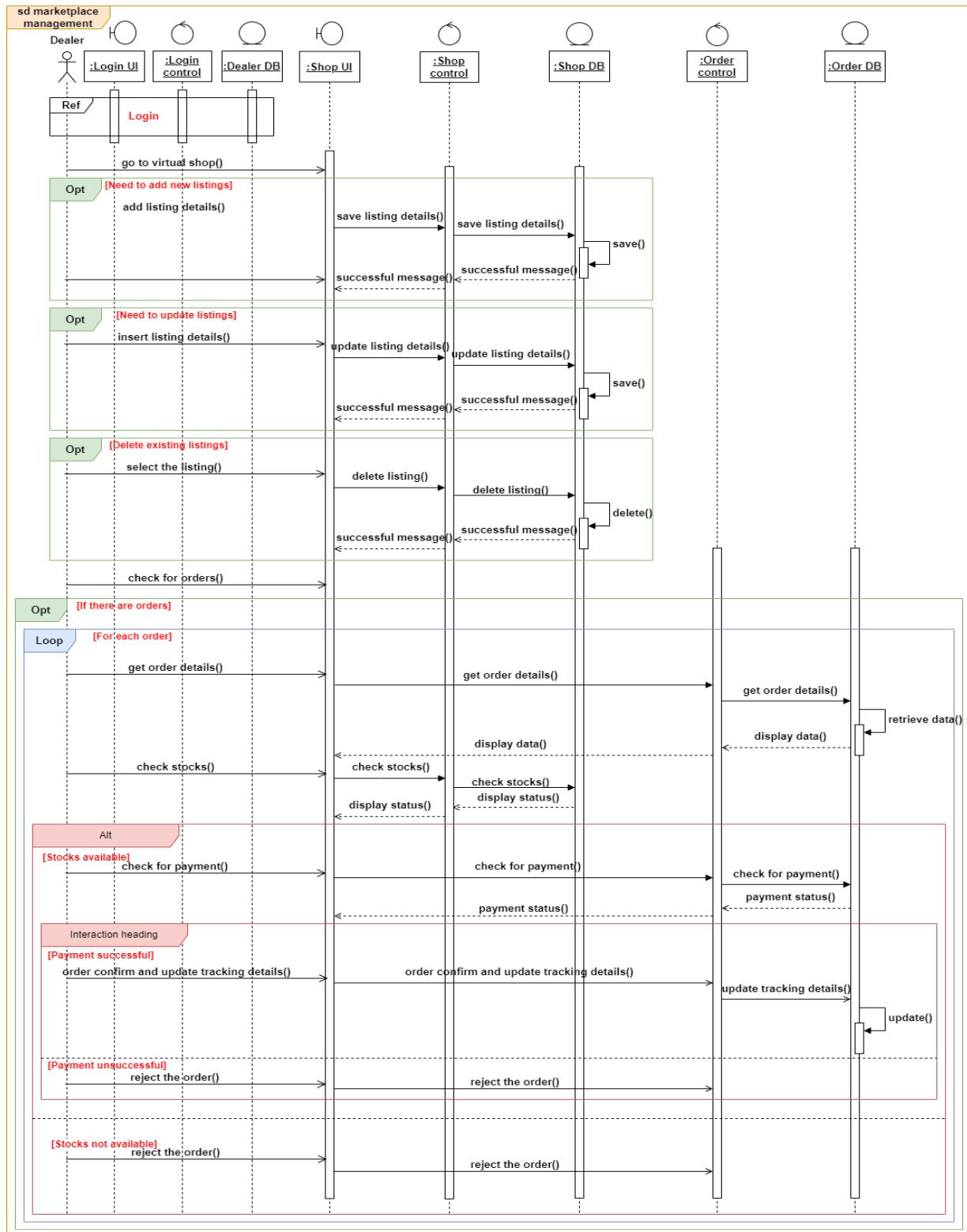


Figure 6-17 Sequence diagram of Fertilizer Inventory Management

Article and Promotion Management

The Article and Promotion Management function within our system is a multifaceted tool designed to empower company administrators in creating, organizing, and disseminating promotional content and informative articles tailored to the agricultural community. Administrators wield the capability to craft diverse promotional content, spanning from advertisements and special offers to seasonal promotions, and have the flexibility to schedule these campaigns according to specific start and end dates. This feature ensures timely and strategic promotion of products and services, maximizing their impact and relevance to users.

Moreover, the system provides administrators with a robust platform for publishing articles, guides, and tips related to farming practices, soil management, and fertilizer usage. Through an intuitive rich text editor, administrators can create content enriched with multimedia elements such as images, videos, and hyperlinks, enhancing the readability and engagement of the material. The ability to categorize and tag articles facilitates efficient organization, enabling users to easily navigate and access relevant information aligned with their interests and needs.

Central to the functionality of the system is the prominent display of promotional content and articles on the platform's homepage. Here, visually appealing layouts and designs capture the attention of users, drawing them into exploring the latest promotions and educational resources. Regular updates to the content ensure its freshness and relevance, fostering continuous engagement and interaction with the platform.

Furthermore, the system's advanced targeting capabilities enable administrators to tailor promotional content and articles to specific user segments based on factors such as preferences, location, and past interactions. This targeted distribution enhances the effectiveness of marketing campaigns, ensuring that content resonates with its intended audience and drives meaningful engagement.

To gauge the impact and performance of promotional campaigns and articles, the system tracks a range of user engagement metrics, including click-through rates and conversion rates. Administrators can leverage comprehensive analytics tools to analyze this data, gaining valuable insights into user behavior and campaign effectiveness. Reports and visualizations generated by these tools empower administrators to make data-driven decisions, refine content strategies, and optimize promotional efforts for maximum reach and impact.

In summary, the Article and Promotion Management function serves as a dynamic hub for administrators to create compelling content, engage with users, and drive growth and visibility within the agricultural community. Its suite of features and analytics capabilities equip administrators with the tools they need to deliver targeted, relevant content that resonates with users and fosters a vibrant and informed user community.

Use case diagram of Article and Promotion Management

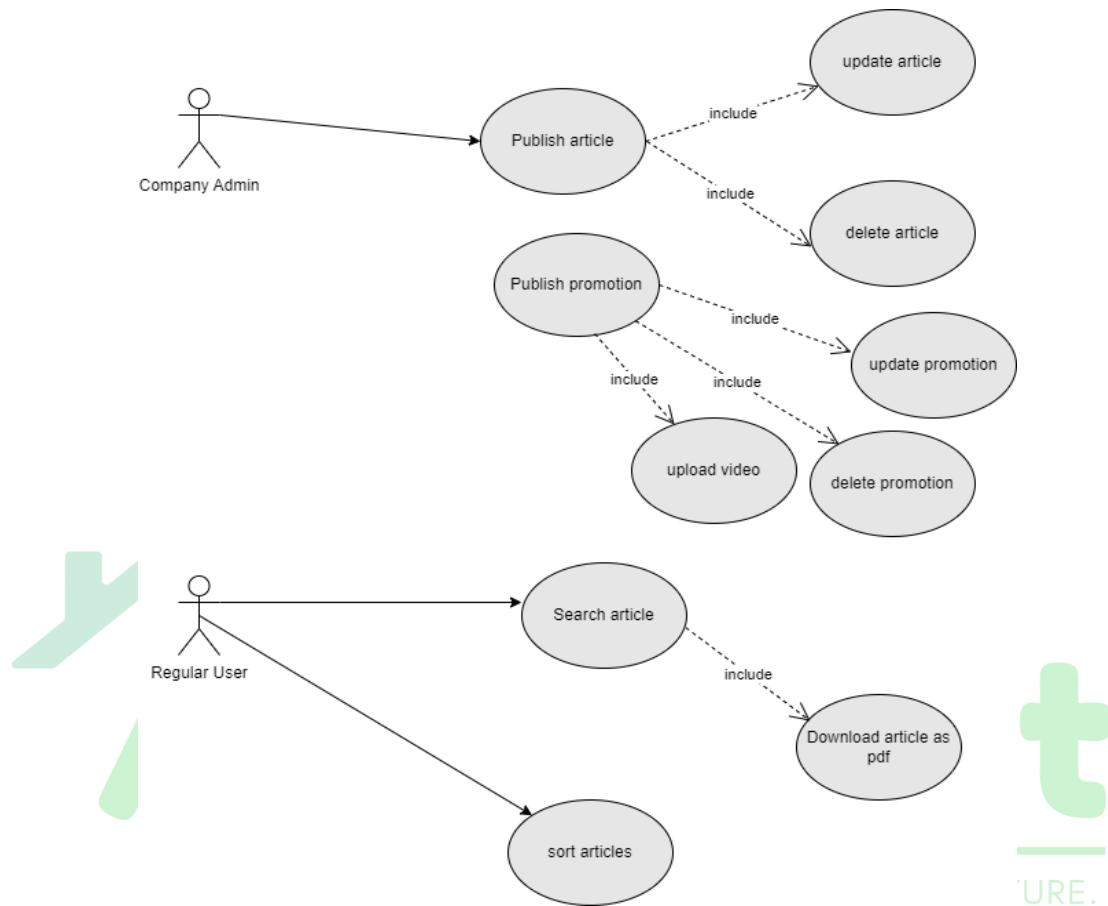
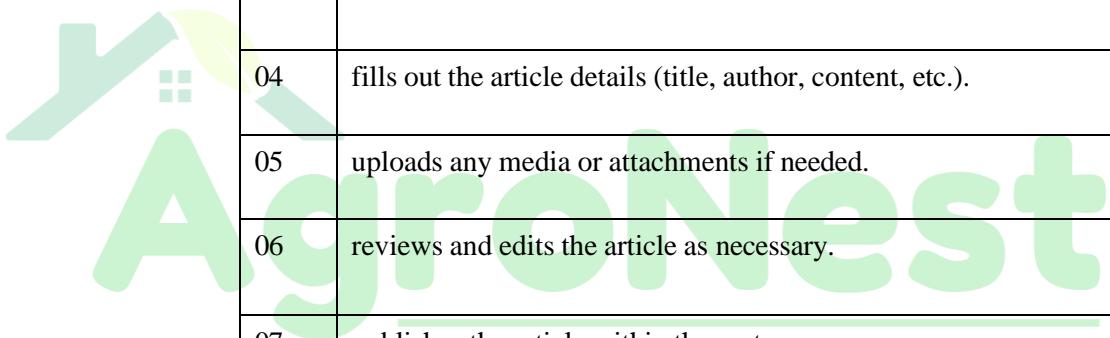
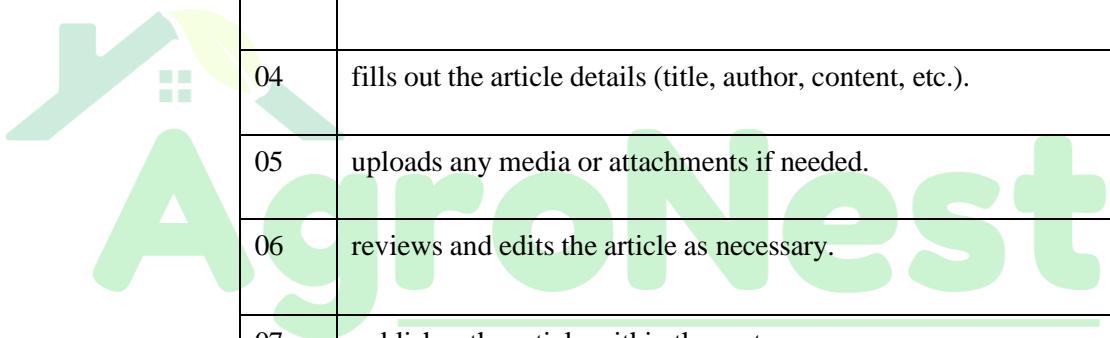


Figure 6-18 Use case diagram of Article and Promotion Management

Use case scenario of Article and Promotion Management

Table 6.5 Use case scenario of Article and Promotion Management

Number	08
Name	Adding an article
Summary	Add an article to the article & promotion handle page.
Priority	8

Pre-conditions	Admin has logged into the system	
Post-conditions	Receive notifications to stakeholders who should be notified regarding the article.	
Primary Actor	System admin	
Trigger	The System Admin initiates the process to add a new article.	
Main Scenario	Steps	Actions
	01	The System Admin logs into the fertilizer management system.
	02	navigates to the article management interface.
	03	selects the option to add a new article.
	04	fills out the article details (title, author, content, etc.).
	05	uploads any media or attachments if needed.
	06	reviews and edits the article as necessary.
	07	publishes the article within the system.
Extension	Steps	Branching Action
	5a	If the article includes images, videos, or downloadable resources, the System Admin can upload these files through the article management interface.
	5b	The System Admin ensures proper naming conventions and metadata for uploaded media to enhance accessibility and searchability.
Open issues		The system does not currently provide a feature for collaborative editing, where multiple users can simultaneously work on drafting or editing an article before it is published. Implementing a collaborative editing functionality would enhance collaboration among admins, streamlining the article creation process and improving efficiency. Should the system provide this feature as well?

Sequence diagram of Article and Promotion Management

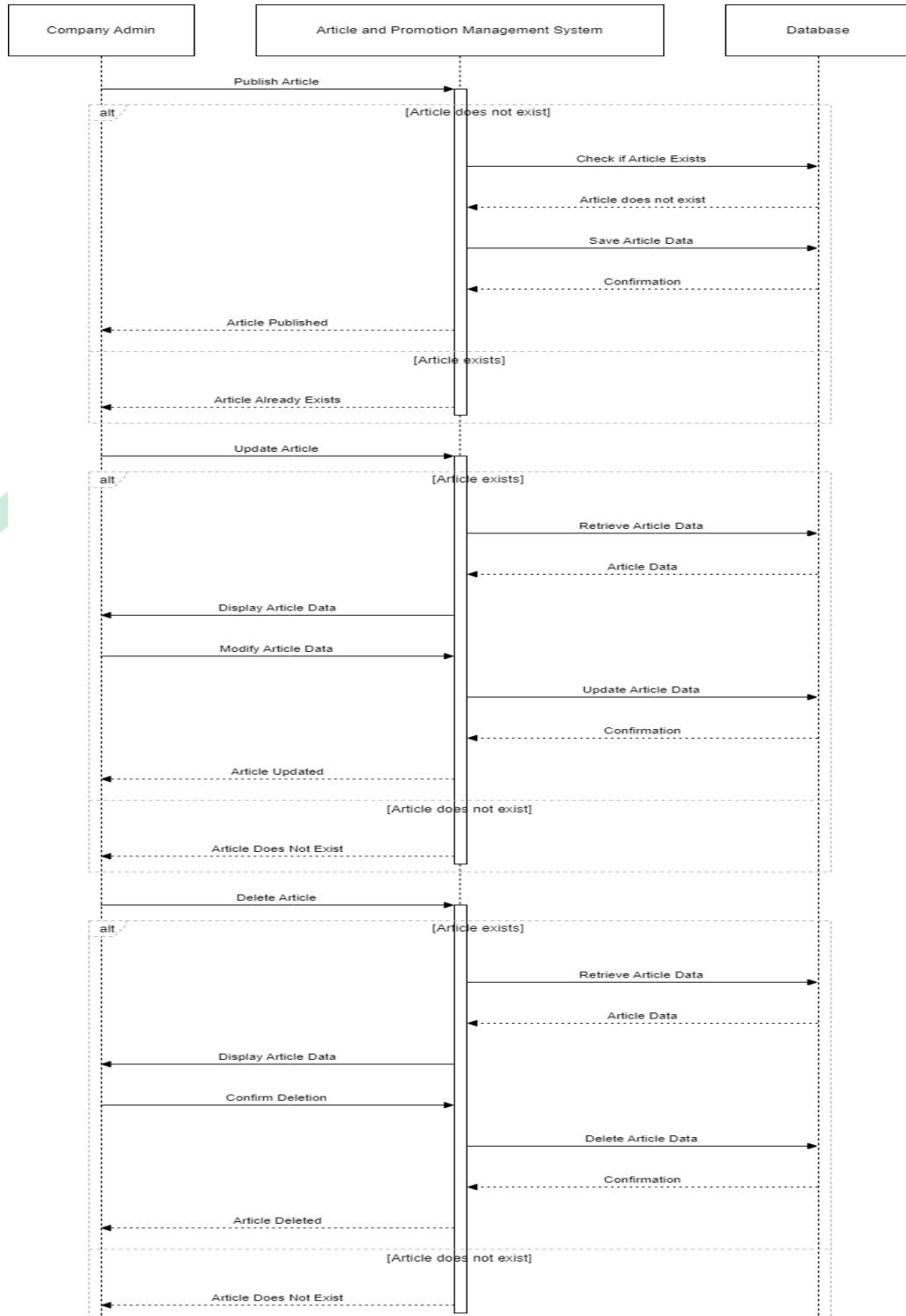


Figure 6-19 Sequence diagram of Article and Promotion Management

Manage Admin Dashboard

The Admin Dashboard Management section of our Fertilizer Management System empowers administrators with a comprehensive suite of features to efficiently monitor and control various aspects of the platform. Administrators have complete authority over user accounts, enabling them to access detailed profiles and transaction histories for farmers and dealers alike. This level of oversight allows administrators to maintain data integrity by identifying and managing inactive or suspicious accounts, thereby ensuring the platform's security and reliability. Moreover, administrators can leverage the system's flexible data export capabilities to generate customized reports and analyses, providing valuable insights into user behavior, market trends, and system performance.

Furthermore, the admin module extends its functionality to encompass laboratory management, offering administrators a centralized view of all registered laboratories. Administrators can effortlessly navigate through laboratory information, utilizing filters based on location or other criteria to streamline oversight and compliance monitoring. The ability to export laboratory data facilitates regulatory reporting and analysis, enabling administrators to uphold quality standards and ensure regulatory compliance across the platform.

A standout feature of the admin module is its advanced inquiry handling system, designed to efficiently manage and respond to inquiries from farmers and dealers. Administrators can prioritize and categorize incoming inquiries, allowing them to allocate resources effectively and address urgent issues promptly. By providing administrators with comprehensive details and context for each inquiry, the system empowers them to deliver tailored solutions and support to users. The module's tracking capabilities enable administrators to monitor the status of inquiries, track resolution progress, and maintain a transparent and accountable communication channel with users.

In summary, the Admin Dashboard Management section serves as the nerve center of our Fertilizer Management System, equipping administrators with the tools and insights needed to ensure the platform's success. By offering robust user account management, streamlined laboratory oversight, and efficient inquiry handling capabilities, the admin module empowers administrators to uphold data integrity, regulatory compliance, and user satisfaction, ultimately contributing to the overall effectiveness and reliability of the platform.

Use case diagram of Manage Admin Dashboard

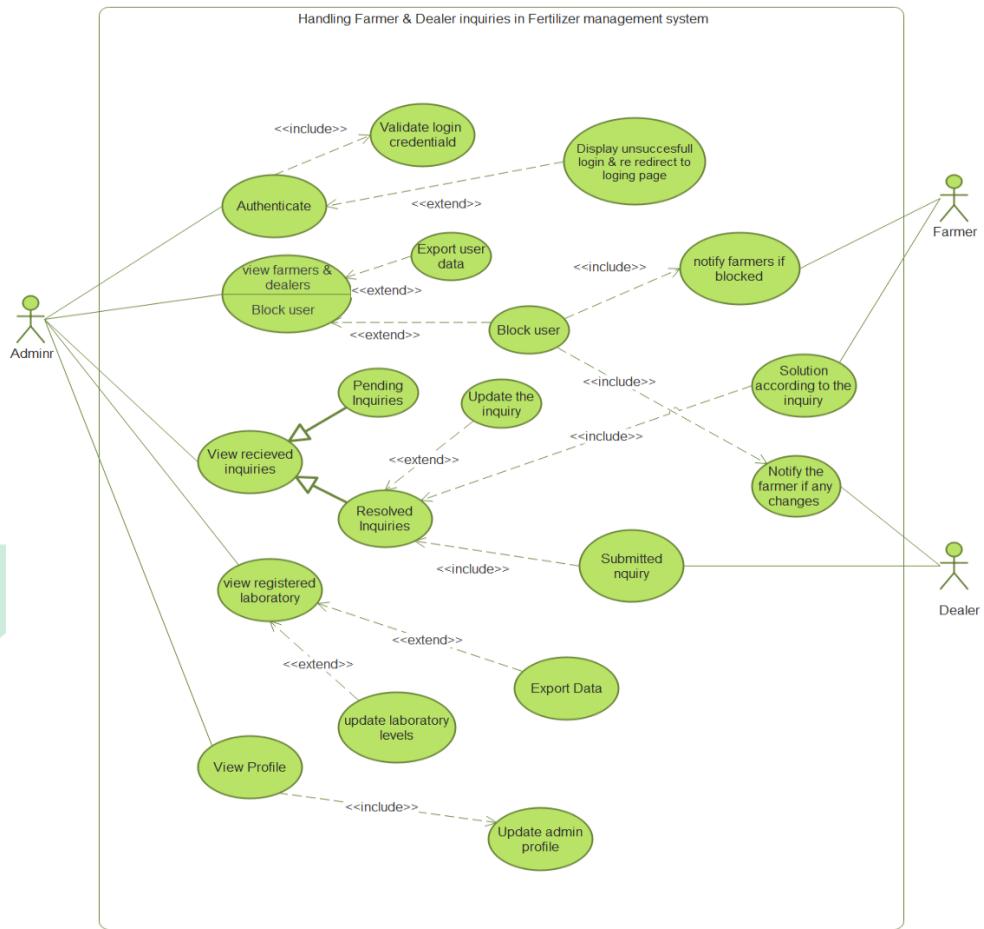
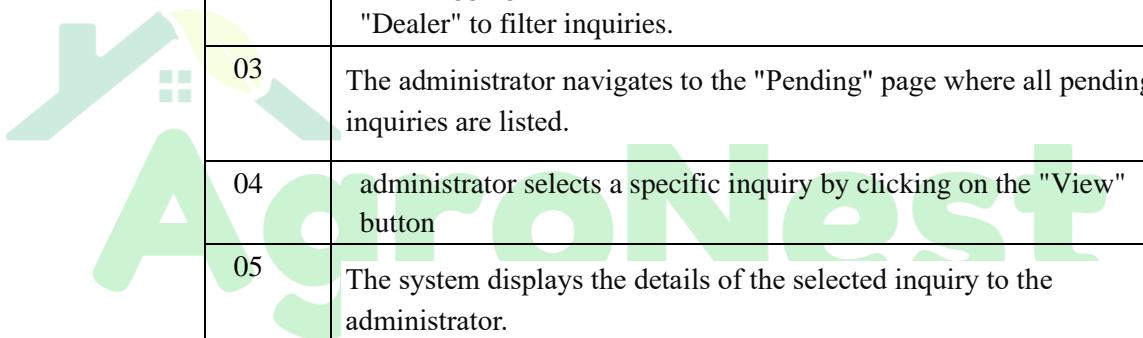


Figure 6-20 Use case diagram of Manage Admin Dashboard

Use case scenario of Manage Admin Dashboard

Table 6.6 Use case scenario of Manage Admin Dashboard

Number	05
Name	User Inquiry Management
Summary	Manage user submitted inquiries and provide necessary solutions or information for their request.
Priority	5
Pre-conditions	User must log to the system.

	There are pending inquiries from farmers or dealers.	
Post-conditions	<p>The administrator successfully handles the inquiries received from farmers or dealers.</p> <p>Resolved inquiries are moved to the "Resolved" tab for future reference.</p>	
Primary Actor	Administrator	
Secondary Actor	Farmer / Dealer	
Trigger	New inquiry is received from user.	
Main Scenario	Steps	Action
	01	The administrator logs into the system using their credentials.
	02	After logging in, the administrator selects either "Farmer" or "Dealer" to filter inquiries.
	03	The administrator navigates to the "Pending" page where all pending inquiries are listed.
	04	administrator selects a specific inquiry by clicking on the "View" button
	05	The system displays the details of the selected inquiry to the administrator.
	06	The administrator crafts a reply or solution to the inquiry.
	07	sends the reply or solution to the farmer or dealer through the system.
	08	The system updates the status of the inquiry.
	09	can choose to resolve another pending inquiry or view resolved inquiry.
Extension	Steps	Branching Action
	1a	If the invalid login should redirect to the logging page.Displaying "Invalid credention"

	2a	After logging in, the administrator selects either 'Farmer' or 'Dealer' to filter inquiries.
	4a	Administrator can choose to resolve another pending inquiry or view resolved inquiries
	9a	If the administrator chooses to view resolved inquiries, the system displays the list of resolved inquiries."

Activity Diagram of Manage Admin Dashboard

Inquiry Management Activity diagram

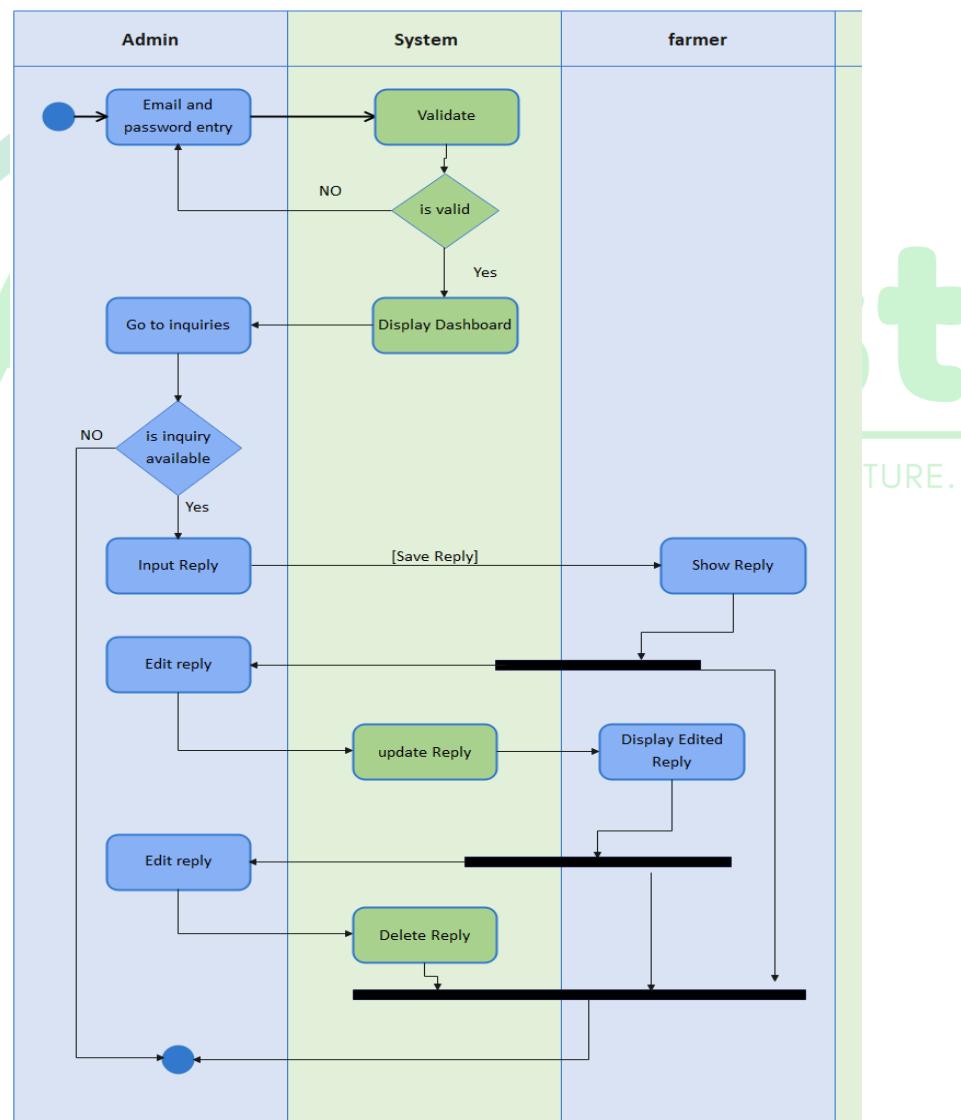


Figure 6-21 Activity Diagram of Manage Admin Dashboard

Sequence diagram of Manage Admin Dashboard

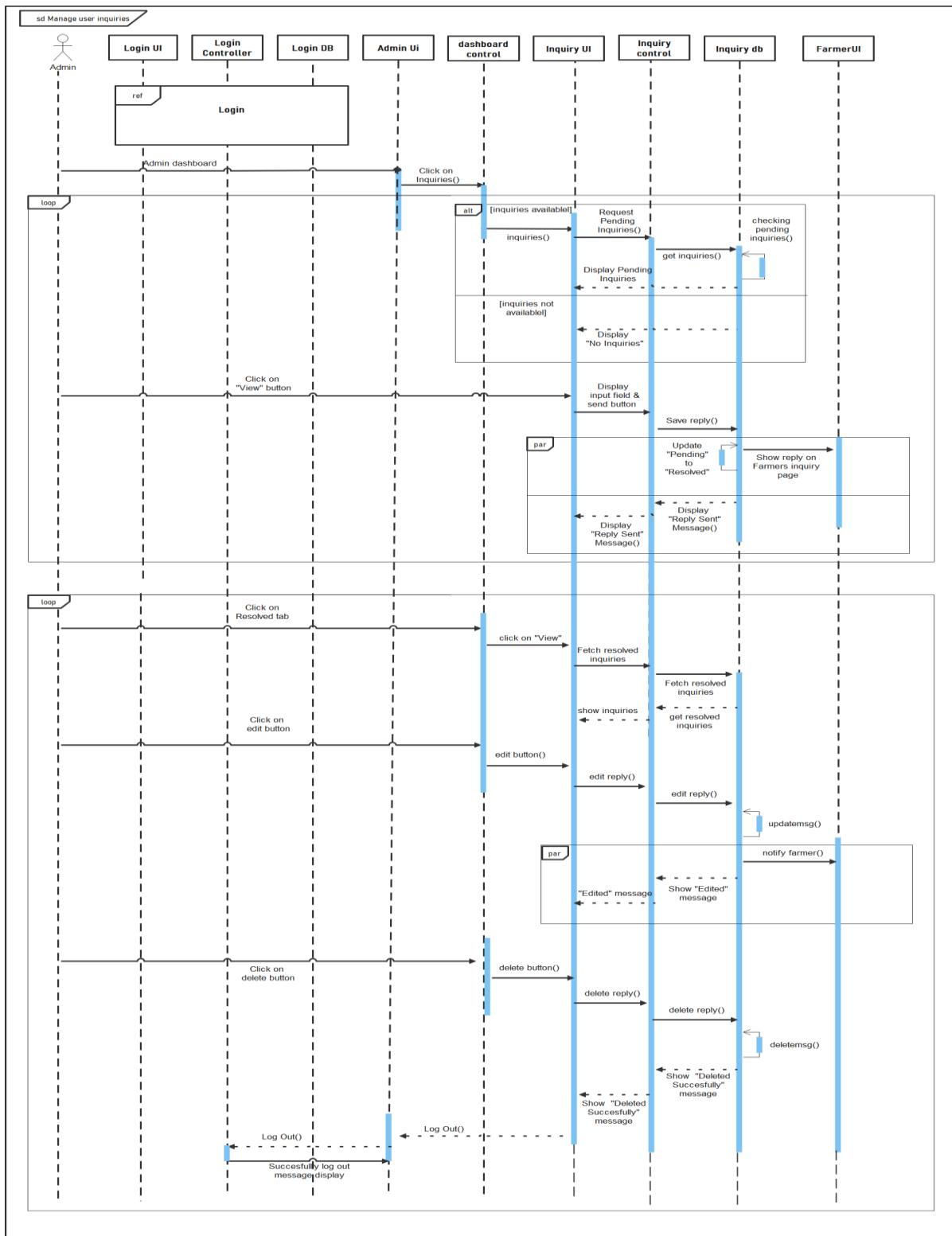


Figure 6-22 Sequence diagram of Manage Admin Dashboard

Feedback and Inquiry Management

The Feedback and Inquiry function serves as a pivotal component within our system, providing users with a robust platform to seek assistance, report issues, and offer valuable feedback. Let's delve deeper into its two main facets:

Inquiry Feature: At its core, the inquiry feature functions as a digital helpdesk, offering users, be it farmers or dealers, a direct channel to communicate with the system's administrators, represented by the company admin. When users encounter challenges, uncertainties, or have queries while navigating the system, they can seamlessly access the inquiry section through the help button conveniently located in the navigation bar. Once there, users can fill out a structured form detailing their concerns, questions, or issues. This form submission triggers a notification to the admin, who promptly reviews and addresses the inquiry. Upon resolution, the inquiry is then archived or moved to a resolved section for future reference, ensuring a systematic approach to issue management and user support.

Feedback and Rating Feature: Complementing the inquiry functionality is the feedback and rating feature, which plays a crucial role in fostering transparency, accountability, and continuous improvement within the system. Designed primarily for farmers, this feature enables them to provide qualitative and quantitative assessments of their interactions with dealers. After purchasing fertilizer products, farmers can rate their dealer experience using a star-based rating system, accompanied by optional comments to elaborate on their feedback. These ratings and comments serve as invaluable insights for dealers, offering a candid glimpse into their performance and areas for enhancement. Dealers can access a dedicated dashboard to review aggregated feedback, gaining visibility into their strengths and areas requiring attention. By analyzing trends and patterns in feedback, dealers can tailor their services to meet user expectations, thereby enhancing overall satisfaction and loyalty.

In essence, the Feedback and Inquiry function embodies the system's commitment to user-centricity, facilitating seamless communication, problem resolution, and performance evaluation. By empowering users to voice their concerns and share their experiences, the function fosters a collaborative ecosystem where feedback drives iterative enhancements, ultimately enriching the user experience and driving organizational success.

Use case diagram of Feedback and Inquiry Management

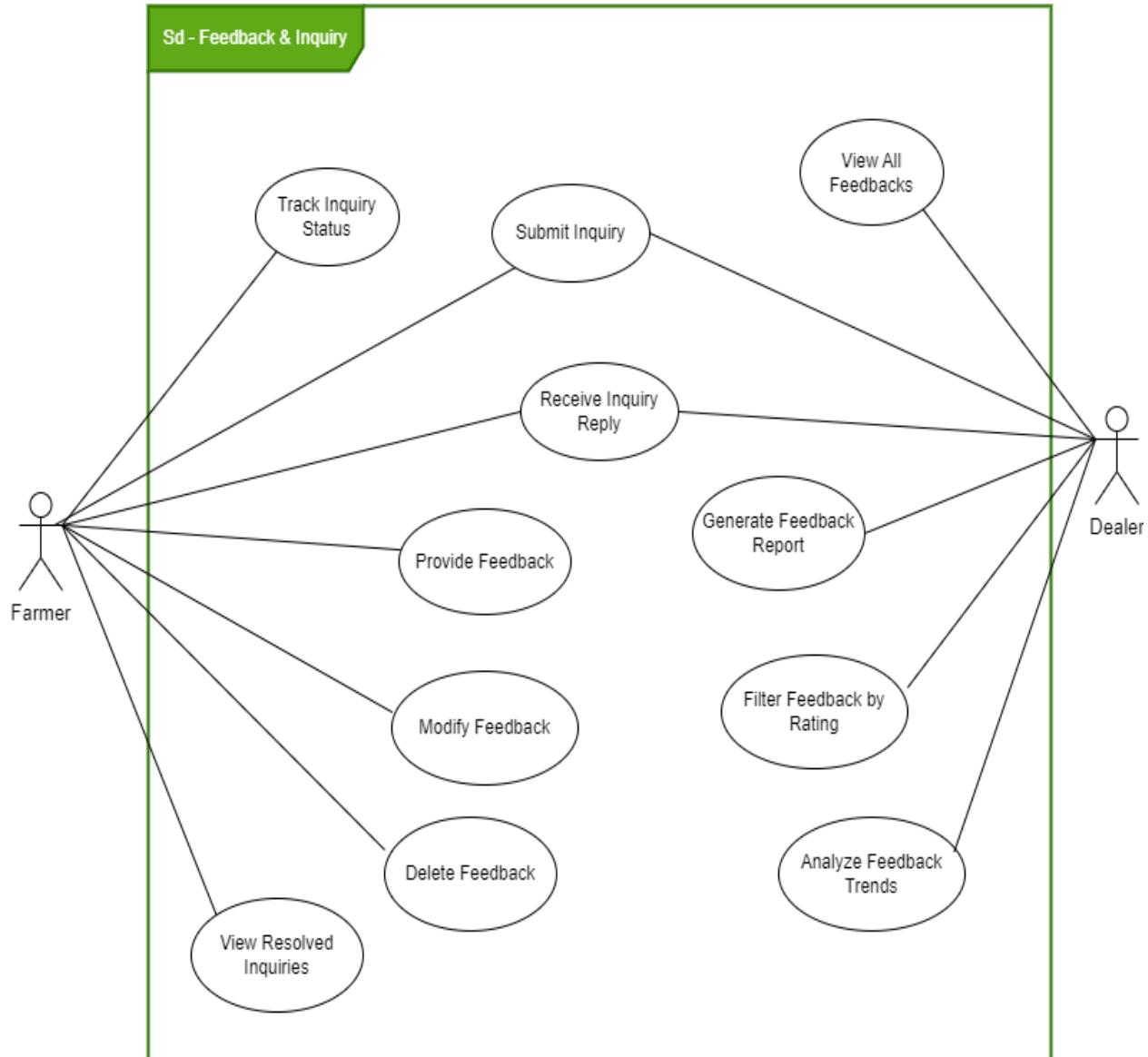


Figure 6-23 Use case diagram of Feedback and Inquiry Management

Use case scenario of Feedback and Inquiry Management

Table 6.7 Use case scenario of Feedback and Inquiry Management

Number	07	
Name	Providing Feedback on Dealer Experience	
Summary	A farmer wishes to provide feedback on their recent experience with a fertilizer dealer.	
Priority	6	
Pre-conditions	The farmer must have purchased fertilizer from a dealer using the system.	
Post-conditions	The farmer's feedback is submitted and stored in the system.	
Primary Actor	Farmer	
Trigger	The farmer completes a transaction with a dealer through the system.	
Main Scenario	Steps	Actions
	01	The farmer completes a transaction to purchase fertilizer from a dealer using the system.
	02	After the transaction, the system prompts the farmer to provide feedback on their experience.
	03	The farmer rates the dealer's performance using a star-based rating system (1 to 5 stars).
	04	The farmer has the option to provide additional comments to elaborate on their rating.
	05	The farmer submits their feedback through the system.
	06	The system stores the feedback along with the transaction details for future reference.
Extension	Steps	Branching Action
	2a	If the farmer chooses not to provide feedback immediately after the transaction, they can access the "Feedback" section in their dashboard later to submit their feedback.
	5a	If the farmer encounters any technical issues while providing feedback, they can reach out to the system administrator for assistance through the inquiry feature.

Sequence diagram of Feedback and Inquiry Management

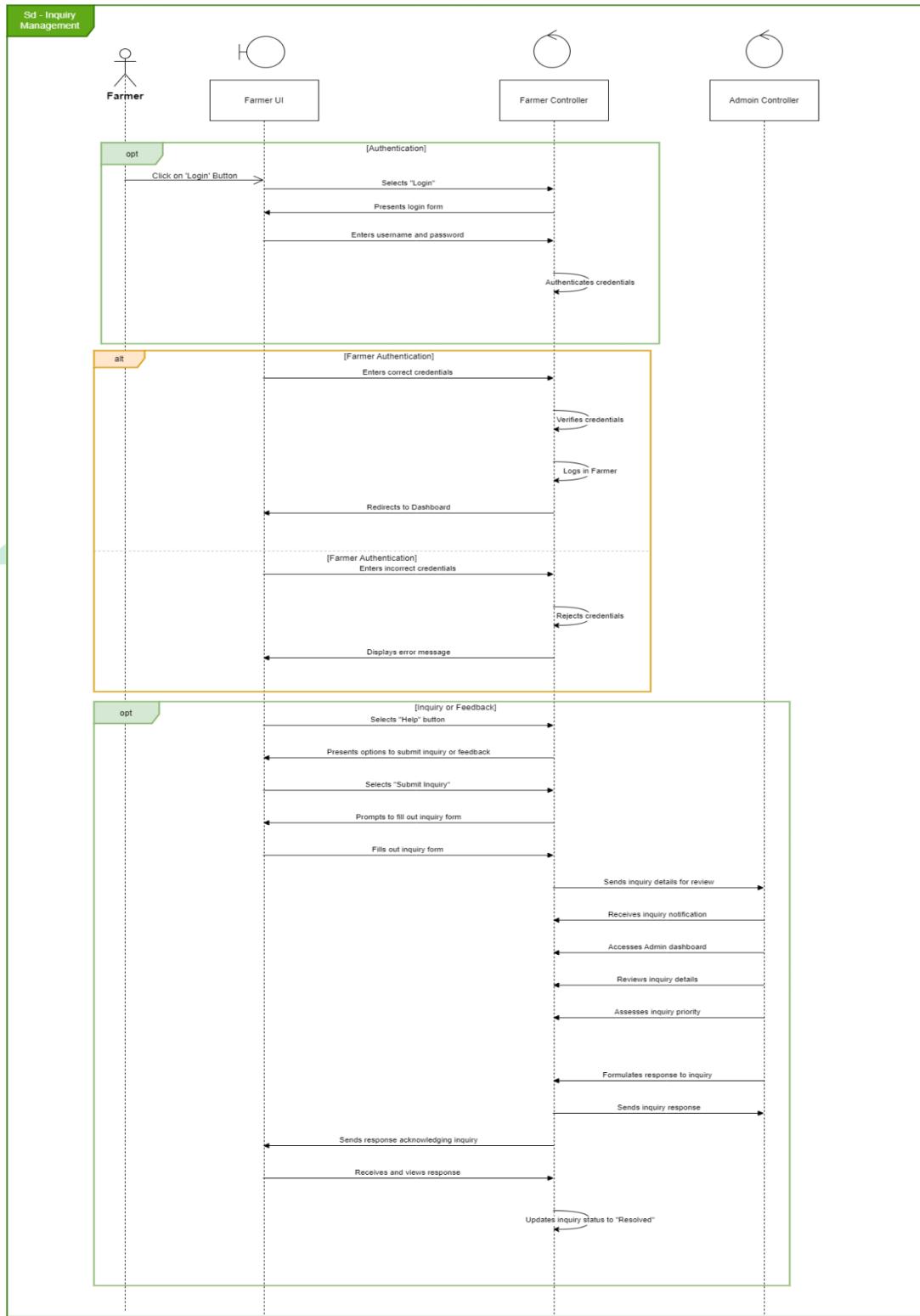


Figure 6-24 Sequence diagram of Feedback and Inquiry Management

Order Management

The Order Management function within our Fertilizer Management System is meticulously crafted to meet the diverse needs of dealers, offering a comprehensive array of features to streamline and elevate the order processing experience. Dealers are provided with an intuitive and user-friendly interface, ensuring seamless navigation and effortless order placement. A standout feature of this function is the extensive order history view, which grants dealers access to detailed insights into their past transactions, including order dates, quantities, and payment statuses. This comprehensive overview empowers dealers to make informed decisions and devise strategic plans based on their transactional history.

In addition to facilitating seamless order placement, the system integrates robust payment management capabilities to ensure secure and convenient transaction processing directly within the platform. Dealers benefit from the flexibility to review and update order details before final confirmation, ensuring accuracy and alignment with their specific requirements. Moreover, the system offers the flexibility for dealers to delete orders if necessary, providing them with added control and flexibility in managing their transactions.

One of the most noteworthy aspects of the Order Management function is its sophisticated search functionality for fertilizers. This feature enables dealers to swiftly locate specific products based on various criteria such as brand, type, or nutrient composition, streamlining the ordering process and enhancing overall efficiency. By minimizing the time spent searching for products, dealers can focus more on their core business activities, thereby increasing productivity and optimizing operational efficiency.

Furthermore, dealers have the capability to effortlessly download invoices for their orders, facilitating seamless documentation and record-keeping processes. This feature ensures compliance with accounting and regulatory requirements while also providing dealers with a convenient way to track their financial transactions. Additionally, the system generates real-time notifications and alerts to keep dealers informed about the status of their orders, ensuring transparency and timely communication throughout the order fulfillment process.

This comprehensive suite of functionalities not only simplifies order management but also fosters transparency, efficiency, and accountability throughout the entire process. Ultimately, the Order Management function empowers dealers to optimize their operations, improve customer satisfaction, and drive business success in the competitive agricultural market.

Use case diagram of Order Management

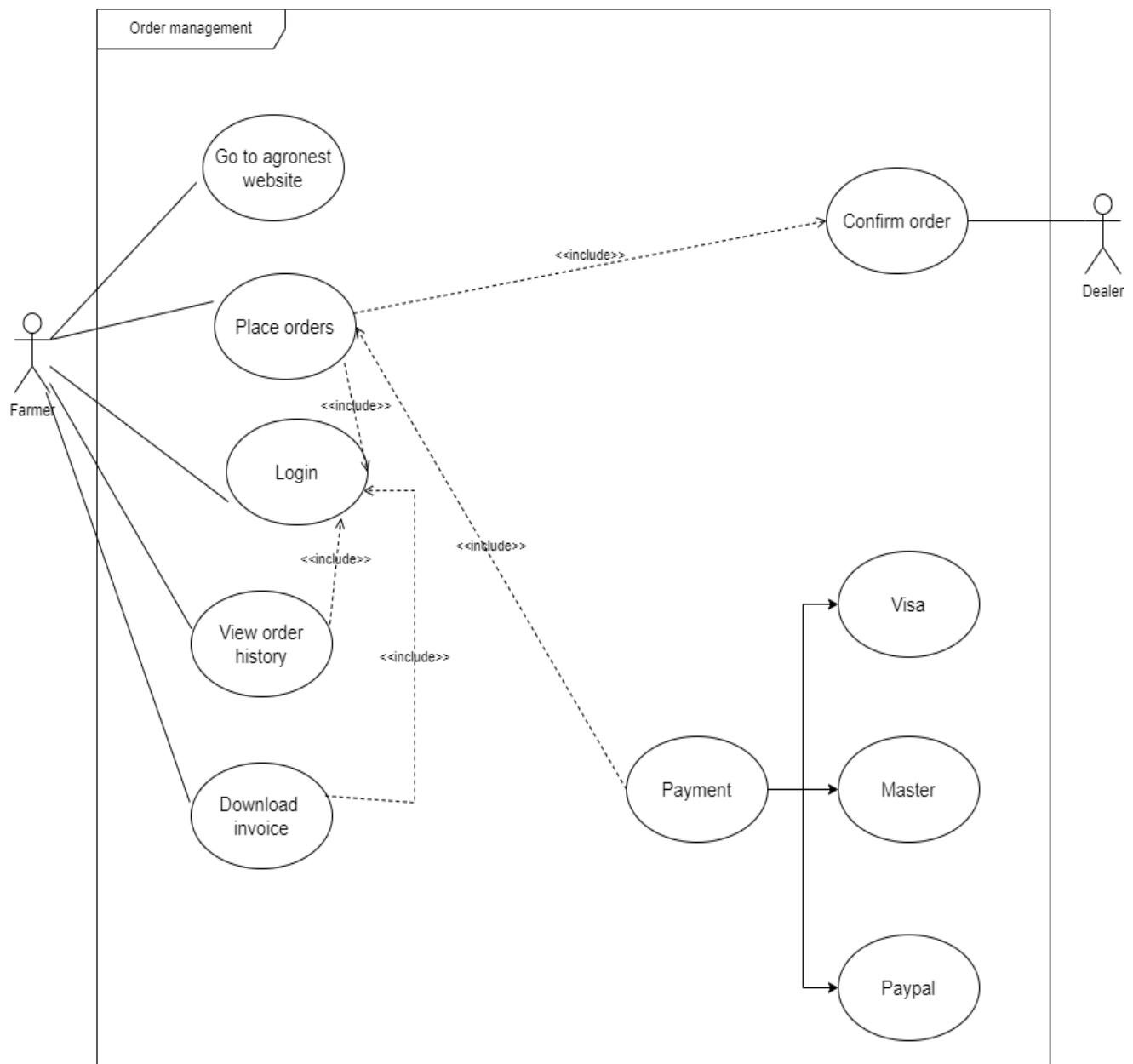


Figure 6-25 Use case diagram of Order Management

Use case scenario of Order Management

Table 6.8 Use case scenario of Order Management

Number	02	
Name	Place fertilizer orders	
Summary	Add/ update/remove fertilizers orders using the system	
Priority	1	
Pre-conditions	Log in to the site	
Post-conditions	After placing orders logout from the system	
Primary Actor	Farmer	
Trigger	The farmer wants to place orders in the system	
Main Scenario	Steps	Actions
	01	The farmer logs in to the fertilizer management system
	02	Navigates to the fertilizer buying page
	03	Go through a fertilizer type that wants to place an order.
	04	Fill the needed quantity and click the buy button
	05	Go through the payment management system
	06	Fill all necessary fields in payment management
	07	Click the buy now button and place the order
Extension	Steps	Branching Action
	1a	If login credential is incorrect, system will display an error message
	1b	System asks to re-login
	4a	System displays a message that show “Are want to buy”
	6a	If payment details incorrect or incomplete system not allow to make payment
Open issues	1	Currently, there is no correct way to do the payment.

Activity diagram of Order Management

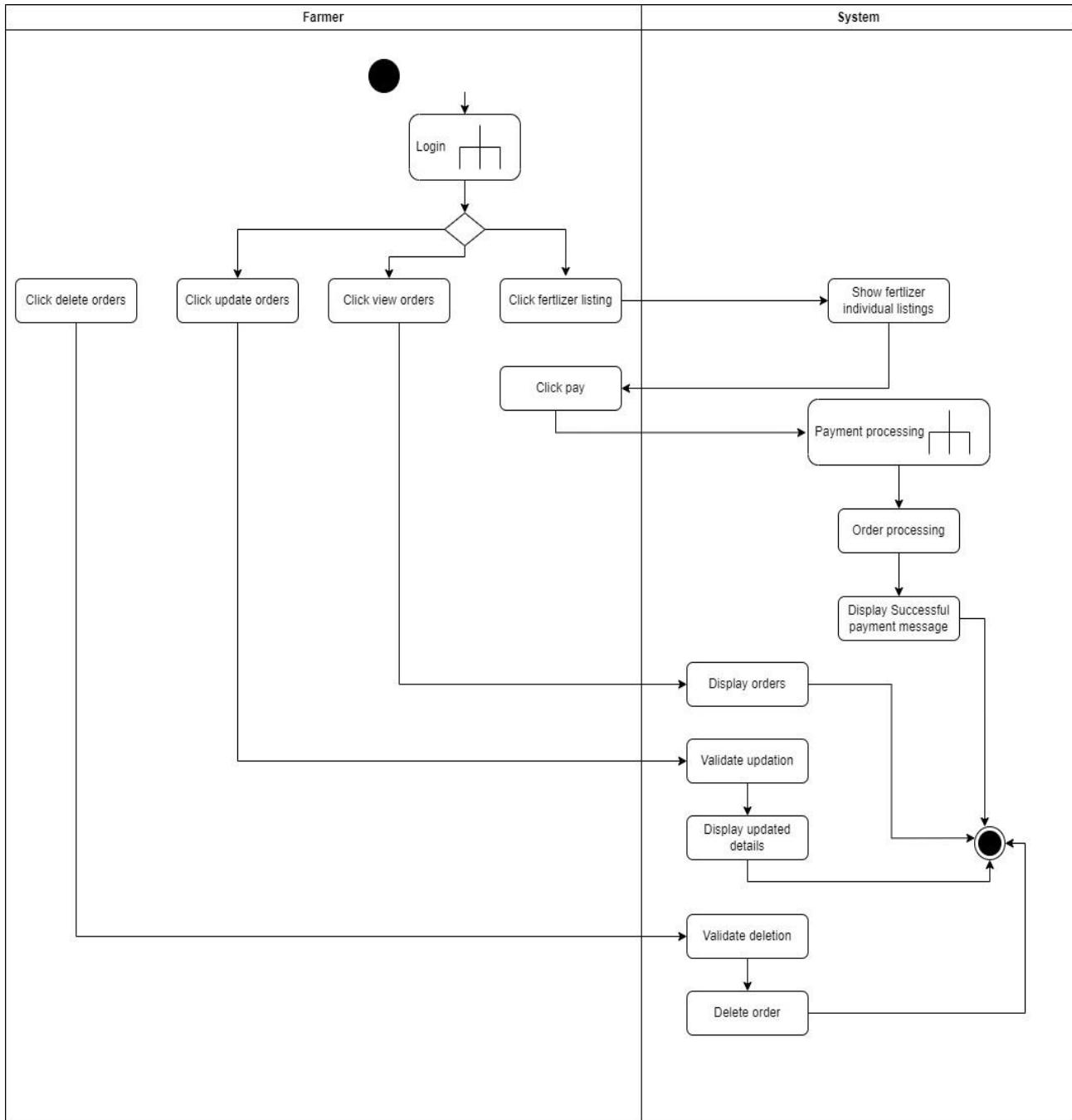


Figure 6-26 Activity diagram of Order Management

Sequence diagram of Order Management

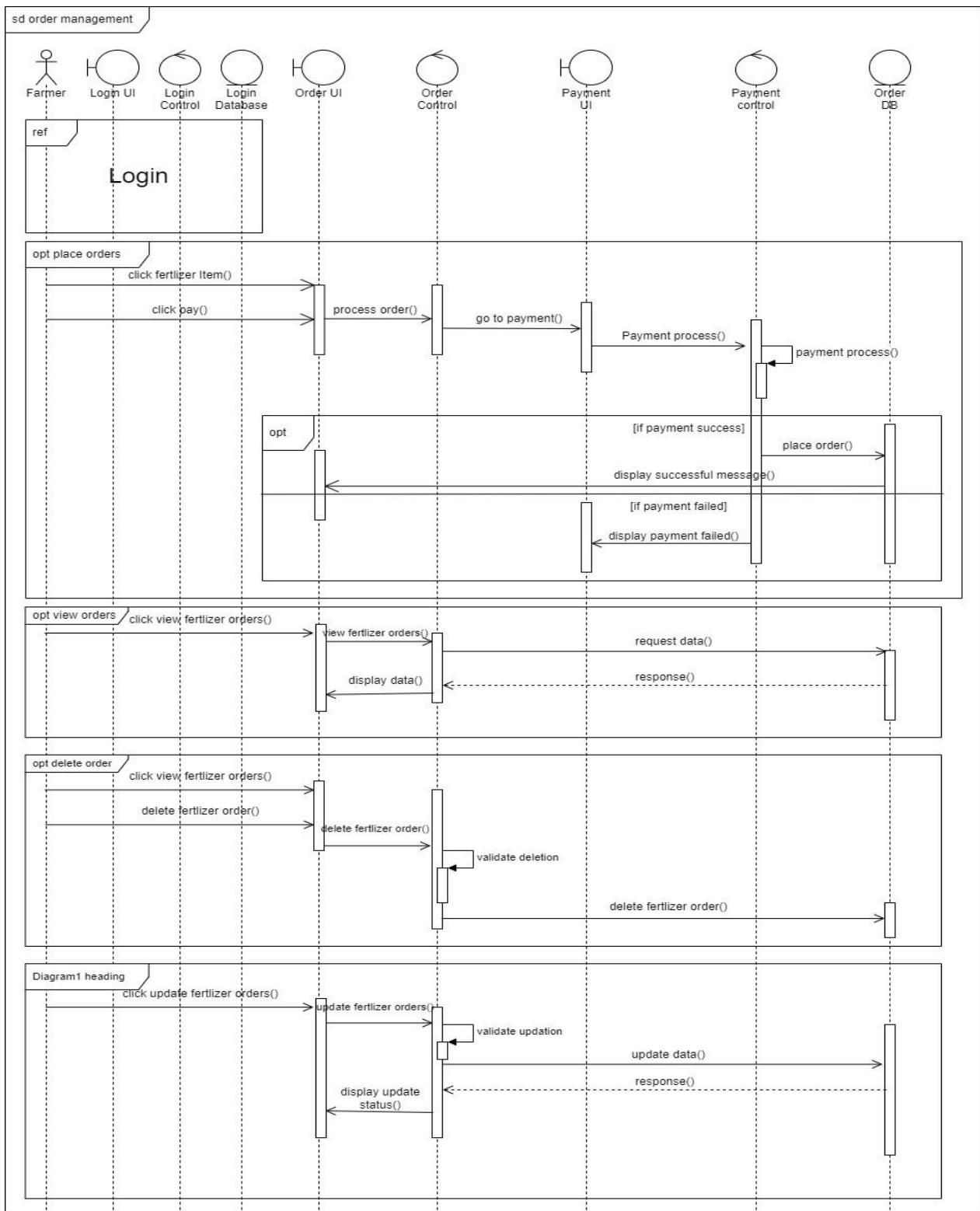


Figure 6-27 Sequence diagram of Order Management

NON-FUNCTIONAL REQUIREMENTS

Usability:

The system should have a user-friendly interface, with intuitive navigation and clear instructions to facilitate easy interaction for users of varying technical expertise.

Reliability:

The system should operate consistently and reliably under normal and peak load conditions, minimizing downtime and ensuring uninterrupted access to essential functionalities.

Performance:

The system should demonstrate optimal performance, with fast response times for user interactions, quick data processing, and minimal latency in delivering requested information.

Scalability:

The system should be scalable to accommodate an increasing number of users, data volume, and concurrent transactions without compromising performance or stability.

Security:

The system should implement robust security measures to safeguard sensitive data, including user information, transaction details, and proprietary business data, against unauthorized access, manipulation, or breaches.

Data Integrity:

The system should ensure the integrity and accuracy of data by implementing mechanisms for data validation, error detection, and data consistency checks throughout the application lifecycle.

Availability:

The system should be highly available, with redundant components, failover mechanisms, and disaster recovery strategies in place to minimize downtime and ensure continuous operation.

Compliance:

The system should comply with relevant industry standards, regulations, and best practices, including data protection laws, privacy regulations, and security standards, to mitigate legal and regulatory risks.

Interoperability:

The system should support interoperability with external systems, APIs, and data formats to facilitate seamless integration with third-party services and interoperability between different components within the ecosystem.

Maintainability:

The system should be designed with modular, well-documented codebase and architecture, facilitating ease of maintenance, updates, and enhancements over time.

CLASS DIAGRAM

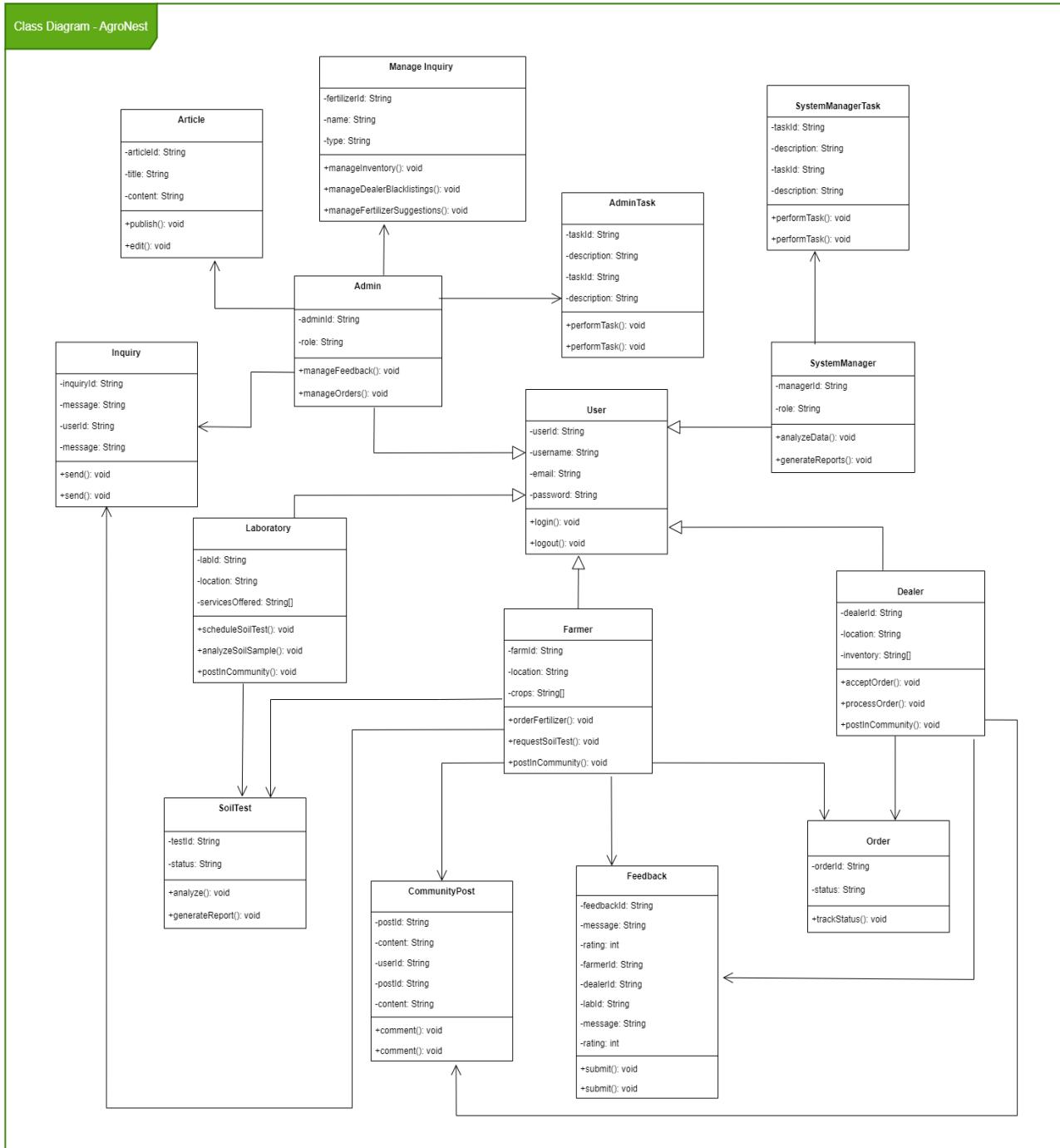
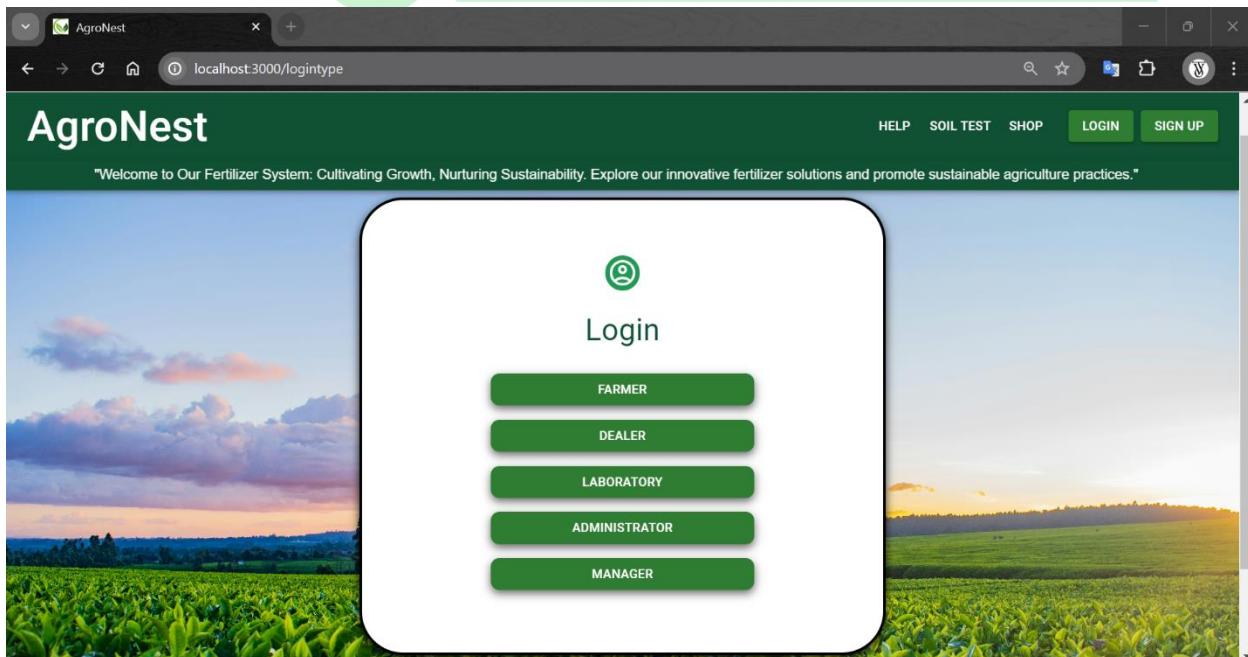
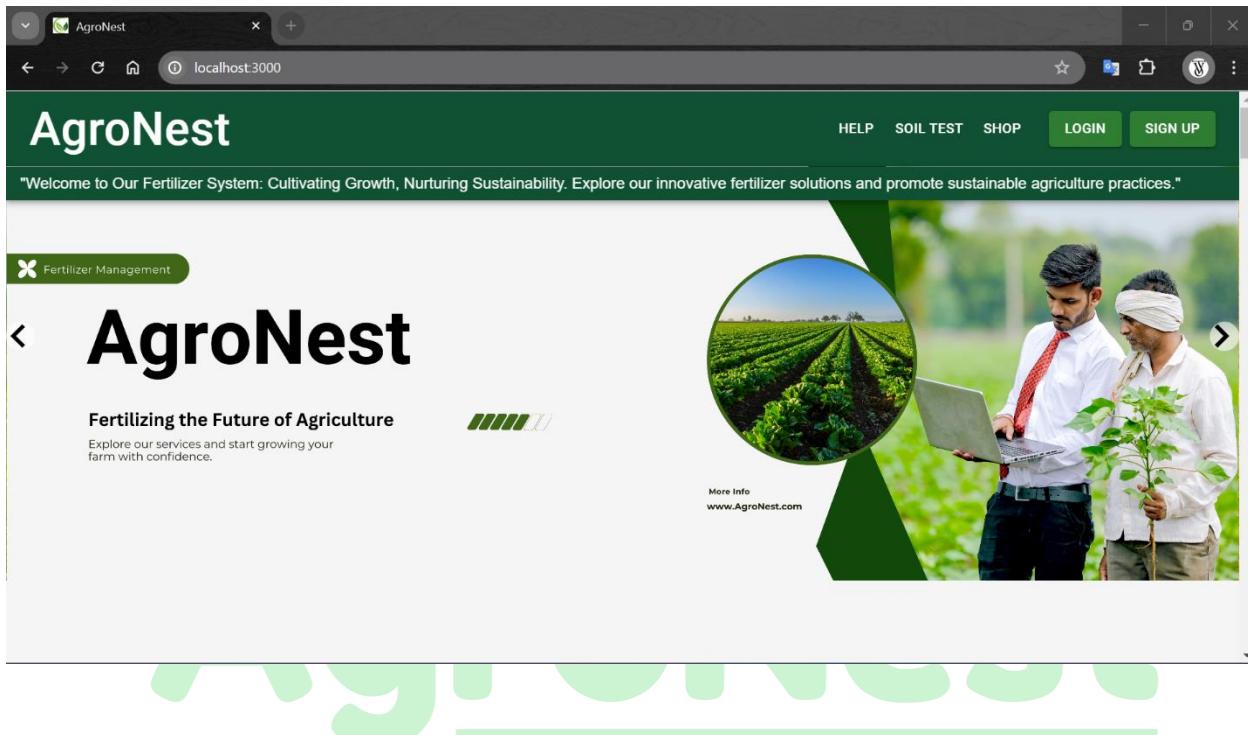


Figure 6-28 CLASS DIAGRAM

USER INTERFACES

Home & Login



Laboratory Management



AgroNest
FUTURE OF AGRICULTURE.

AgroNest

"Welcome to Our Fertilizer Management System. Explore our innovative fertilizer solutions and promote sustainable agriculture practices."

Lab Dashboard PENDING ACCEPTED COMPLETED Hello Oshini

Search...

Request ID	Name	Test Type	Date	Start Time	Status
66237ff192f5f7d8f2eeda01	Nimal Peiris	You have 4 new requests since your last visit. 			
6623806e92f5f7d8f2eeda0b	Hash Fernando		4-22	08:00	Pending
6623805f92f5f7d8f2eeda09	Nimal Peiris	pH Test	2024-04-23	08:00	Pending
6623802992f5f7d8f2eeda05	Sudarshana Perera	Nutrients Test	2024-04-23	10:00	Pending
6623810592f5f7d8f2eeda44	Alex Fernando	Special Test	2024-04-23	11:00	Pending
66375865e186538b624f9d19	Kavindu Pramod	Soil analysis	2024-05-01	09:00	Pending

AgroNest

"Welcome to Our Fertilizer Management System. Explore our innovative fertilizer solutions and promote sustainable agriculture practices."

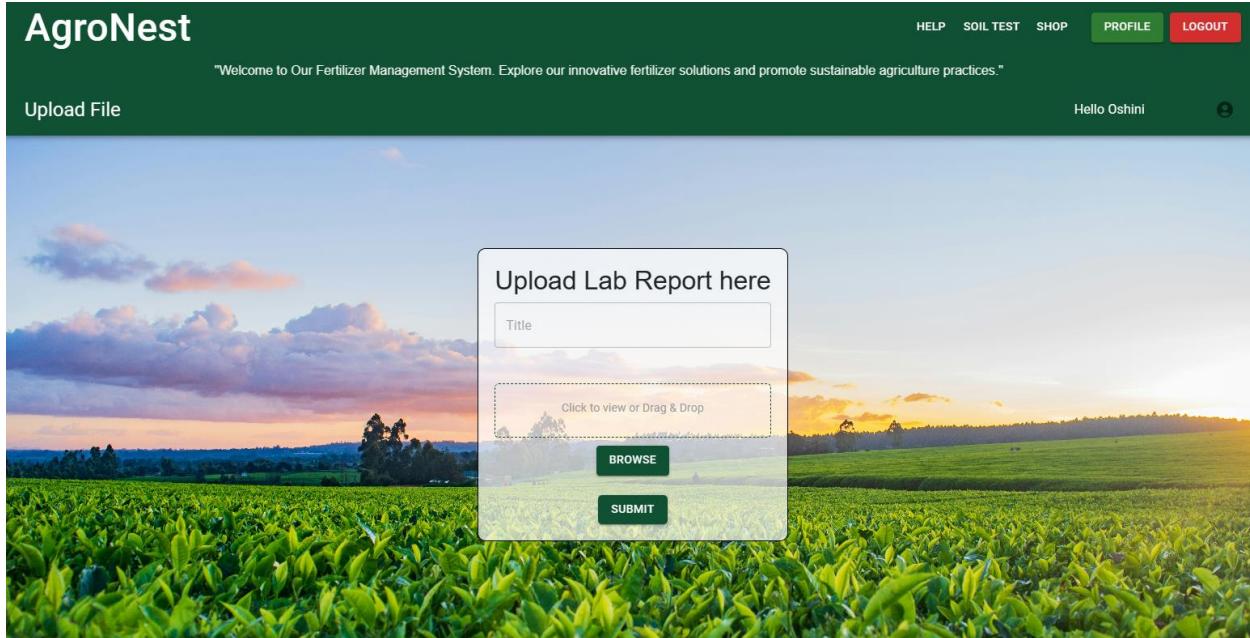
Lab Dashboard PENDING ACCEPTED COMPLETED Hello Oshini

Search...

Request ID	Name	Test Type	Date	Start Time	Status	Report
6623800a92f5f7d8f2eeda03	Sudarshana Perera	pH Test	2024-04-20	14:00	Completed	
6623804f92f5f7d8f2eeda07	Hash Fernando	Nutrients Test	2024-04-20	16:00	Completed	
6623809d92f5f7d8f2eeda0f	Nimal Peiris	Special Test	2024-04-20	16:00	Completed	
6623808b92f5f7d8f2eeda0d	Nimal Peiris	pH Test	2024-04-22	11:00	Completed	



68



This screenshot shows the "Your Details" page from the AgroNest website. The page has a dark green header with the AgroNest logo, a welcome message, and navigation links. A large watermark of the word "AgroNest" is centered. The main content area is titled "Your Details" with a back arrow icon. It contains several form fields: Name (Soil Test Laboratories), Address (Main Road, Maharagama), Phone (715608048), District (Colombo), City (Maharagama), and Level (0). At the bottom are three buttons: "EDIT" (blue), "DELETE ACCOUNT" (purple), and "DOWNLOAD STATISTICS" (blue). The background features a scenic image of a tea plantation at sunset.

Soil Quality Management

The home page features a green header bar with the AgroNest logo and navigation links: HELP, SOIL TEST, SHOP, LOGIN, and SIGN UP. Below the header is a banner with the text "Empowering Agriculture: Agronest - Leading the Way in Fe". The main content area is divided into four sections: "Request for a Soil Test" (a person standing next to a clipboard), "Pending Requests" (a clock icon), "Resolved Requests" (a clipboard icon), and "Soil Test Types" (a laboratory scene with a DNA helix). The background of the main area is a scenic view of a green field under a cloudy sky.

AgroNest

The page title is "AgroNest" with the subtitle "Empowering Agriculture in Fertilizer Management Solutions for Sustainable Farming Practices and Enhanced Crop Yields." The top navigation bar includes links for PROFILE and LOGOUT. The main content area shows a "Soil Test Request" form with fields for Soil Test Type, Crop Type, Date, District, City, and Laboratory, followed by a SUBMIT button. The background features a scenic view of a green field under a cloudy sky.

AgroNest

HELP SOIL TEST SHOP PROFILE LOGOUT

"Empowering Agriculture: Agronest - Leading

- Profile
- Orders
- Soil Tests
- Feedbacks
- Inquiries
- Logout

Soil Test Requests

Requests	Status	Action
Mineral Content	pending	[View] [Update] [Delete]
Mineral Content	pending	[View] [Update] [Delete]

AgroNest

AgroNest

"Way in Fertilizer Management Solutions for Sustainable Farming Practices and Enhanced Crop Yields."

HELP SOIL TEST SHOP PROFILE LOGOUT

Update Soil Test Request

Soil Test Type
Mineral Content

Crop Type
mango

Date
05/18/2024

District
Puttalam

City
Wennappuwa

Laboratory
SoilTest Laboratory

UPDATE

System Data Analysis

The screenshot shows the AgroNest Manager Dashboard. At the top, there is a navigation bar with links for HELP, SOIL TEST, SHOP, LOGIN, and SIGN UP. Below the navigation bar, a banner reads "Fertilizer Management Solutions for Sustainable Farming Practices and Enhanced Crop Yields." On the left, a sidebar has a blue header labeled "Analysis" and a link to "Admin Registrations". In the center, there are three blue buttons: "Add Top Performing Fertilizer Category", "Add Top Selling Dealer", and "Add Areas With Highest Registrations". Below these buttons is a bar chart titled "Top Sellers" with a legend indicating "Number of Sales". The chart shows five bars of different colors (pink, teal, light blue, yellow, purple) with heights corresponding to the number of sales. The x-axis categories are not explicitly labeled. At the bottom of the dashboard, a footer bar includes the text "© 2024 My App. All rights reserved." and a system status bar showing "83°F Light rain", "ENG INTL", "6:12 PM", and the date "5/12/2024".

The screenshot shows the AgroNest Add Top Fertilizer page. The title "AgroNest" is at the top, followed by a tagline "Empowering Agriculture: Agronest - Leading the Way in Fertilizers". A large central form is titled "Add Top Fertilizer". It contains two input fields: "Fertilizer Name" and "Number Of Sales", each with a placeholder text box. Below the input fields is a "Submit" button. The background of the page is a gradient from dark green at the top to light green at the bottom. At the bottom, a footer bar includes the text "© 2024 My App. All rights reserved." and a system status bar showing "83°F Light rain", "ENG INTL", "6:13 PM", and the date "5/12/2024".

Final AD.svg AgroNest localhost:3000/viewtopfertilizers Gmail YouTube Maps HELP SOIL TEST SHOP LOGIN SIGN UP "Empowering Agriculture: Agronest - Leading the Way in

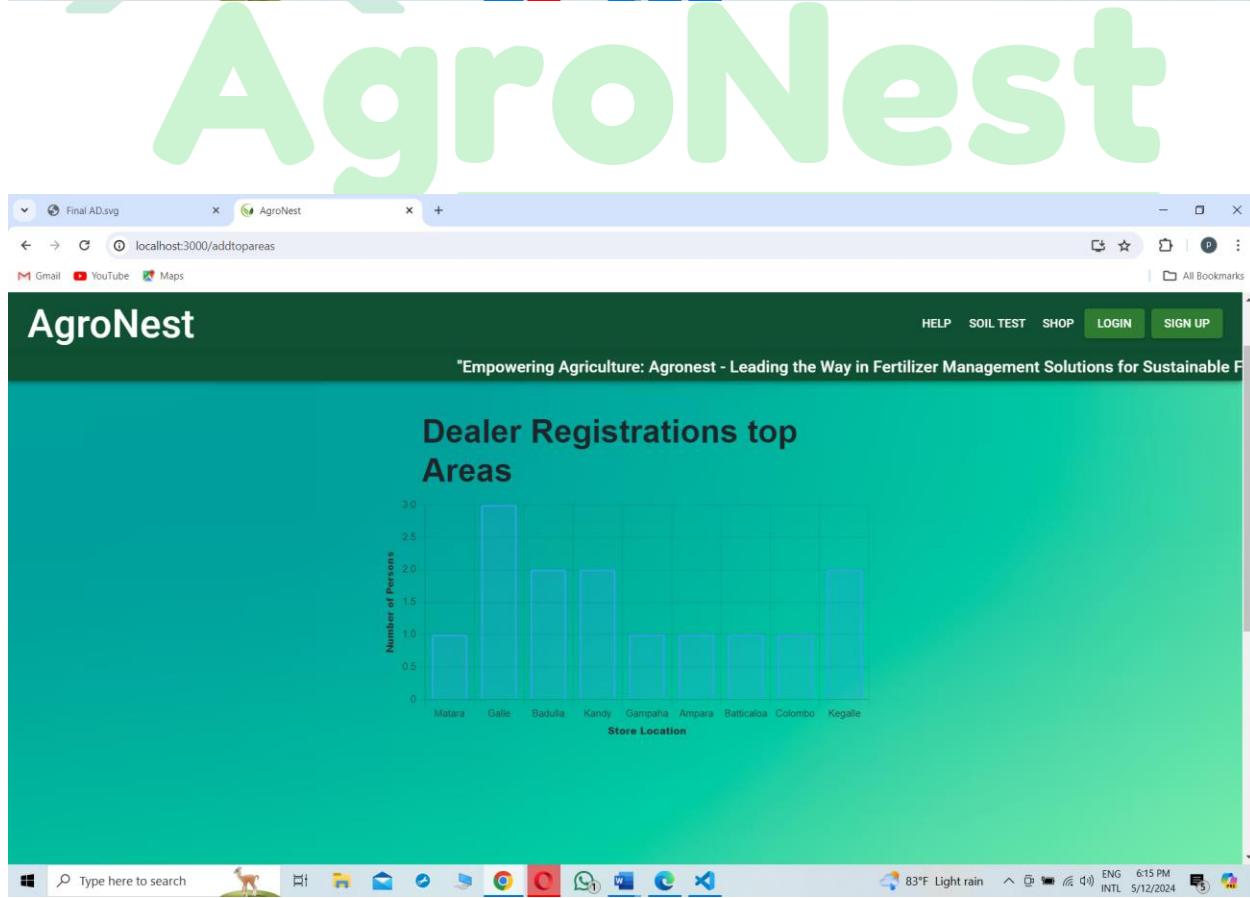
[Go Back](#)

Search by fertilizer name

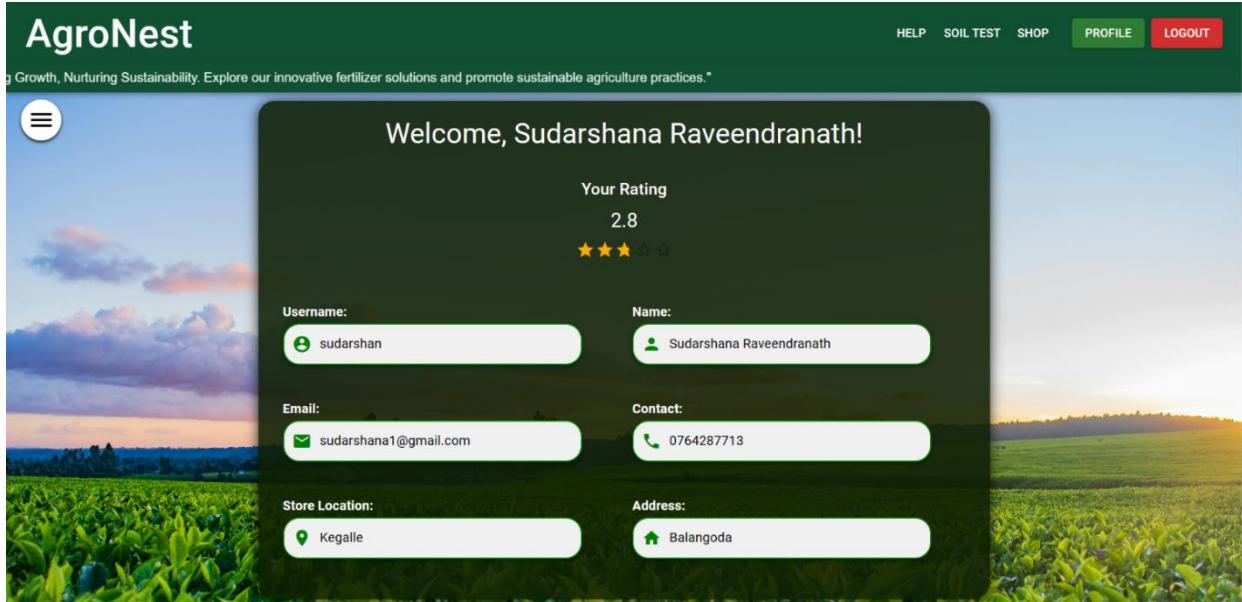
[Download PDF](#)

	Fertilizer Name	Number of Sales	Actions	
1	npk	544	Update	Delete
2	npk	58	Update	Delete
3	npk	58	Update	Delete
4	ecccere	999	Update	Delete
5	df	5555	Update	Delete
6	abcd	2000	Update	Delete
7	dcs	5552	Update	Delete

Type here to search 83°F Light rain ENG INTL 6:14 PM 5/12/2024

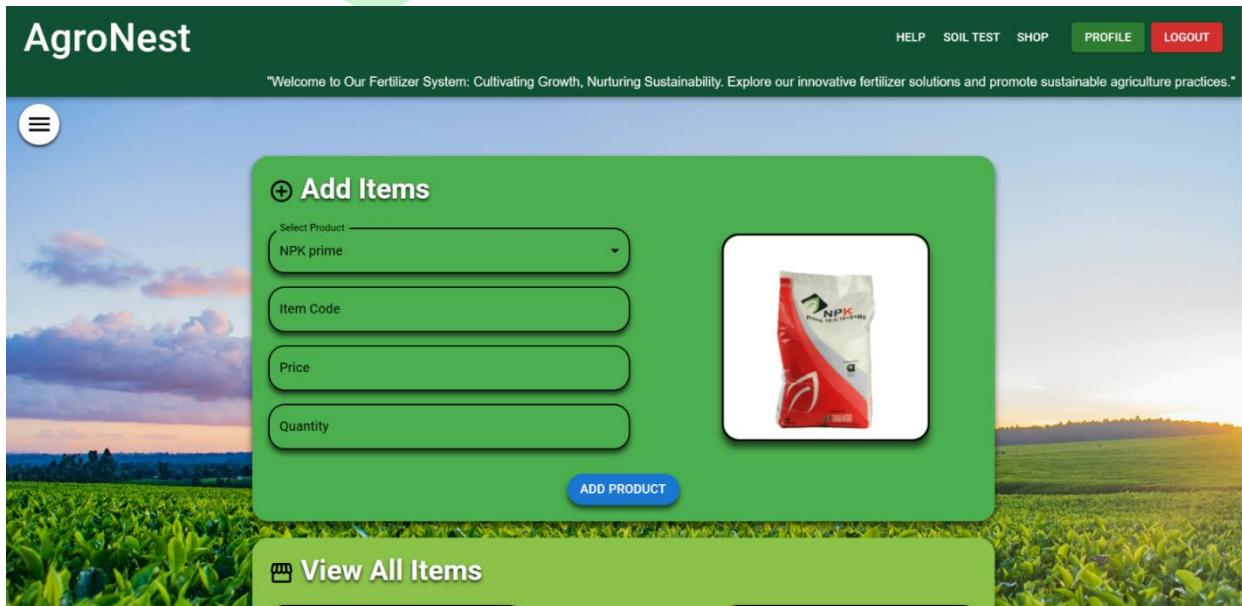


Fertilizer Inventory Management



The screenshot shows the AgroNest profile page. At the top, there's a navigation bar with links for HELP, SOIL TEST, SHOP, PROFILE (highlighted in green), and LOGOUT. The main content area features a welcome message "Welcome, Sudarshana Raveendranath!" and a "Your Rating" section showing a score of 2.8 with three yellow stars and two gray stars. Below this are input fields for Username (sudarshan), Name (Sudarshana Raveendranath), Email (sudarshana1@gmail.com), Contact (0764287713), Store Location (Kegalle), and Address (Balangoda). The background of the page is a scenic image of a tea plantation at sunset.

AgroNest



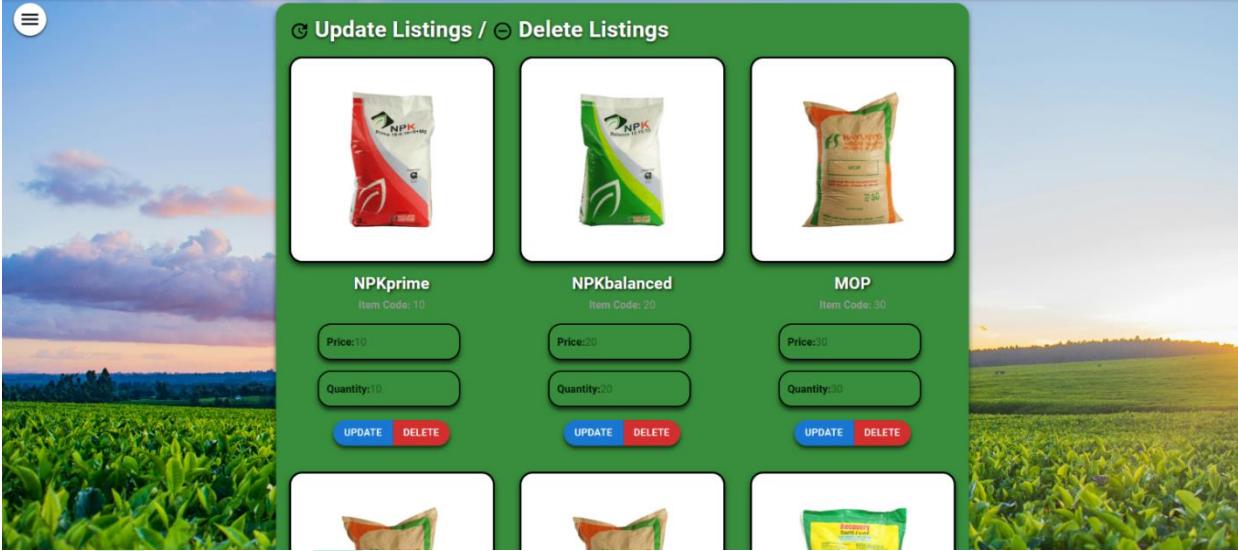
The screenshot shows the AgroNest add items page. At the top, there's a navigation bar with links for HELP, SOIL TEST, SHOP, PROFILE (highlighted in green), and LOGOUT. A welcome message reads: "Welcome to Our Fertilizer System: Cultivating Growth, Nurturing Sustainability. Explore our innovative fertilizer solutions and promote sustainable agriculture practices." The main form is titled "+ Add Items" and includes fields for Select Product (NPK prime), Item Code, Price, and Quantity. To the right of the form is a thumbnail image of a bag of NPK Prime fertilizer. At the bottom left is a "View All Items" button. The background features a scenic image of a tea plantation at sunset.

Cultivating Growth, Nurturing Sustainability. Explore our innovative fertilizer solutions and promote sustainable agriculture practices."

HELP SOIL TEST SHOP PROFILE LOGOUT

Update Listings / Delete Listings

		
NPKprime Item Code: 10	NPKbalanced Item Code: 20	MOP Item Code: 30
Price: 10 <input type="text" value="10"/>	Price: 20 <input type="text" value="20"/>	Price: 30 <input type="text" value="30"/>
Quantity: 10 <input type="text" value="10"/>	Quantity: 20 <input type="text" value="20"/>	Quantity: 30 <input type="text" value="30"/>
<input type="button" value="UPDATE"/> <input type="button" value="DELETE"/>	<input type="button" value="UPDATE"/> <input type="button" value="DELETE"/>	<input type="button" value="UPDATE"/> <input type="button" value="DELETE"/>



AgroNest

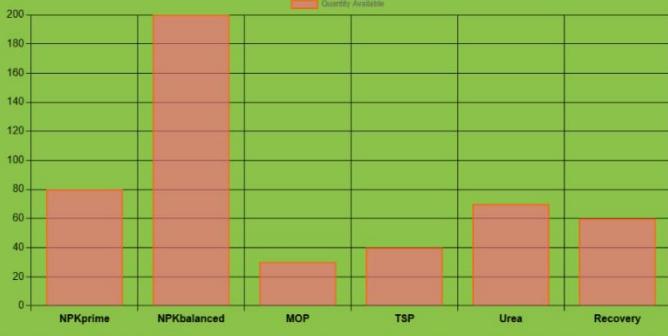
Welcome to Our Fertilizer System. Cultivating Growth, Nurturing Sustainability. Explore our innovative fertilizer solutions and pr...

HELP SOIL TEST SHOP PROFILE LOGOUT

Search Fertilizers

Search

Quantity Available for each Category



Category	Quantity Available
NPKprime	80
NPKbalanced	200
MOP	30
TSP	40
Urea	70
Recovery	60



Article and Promotion Management

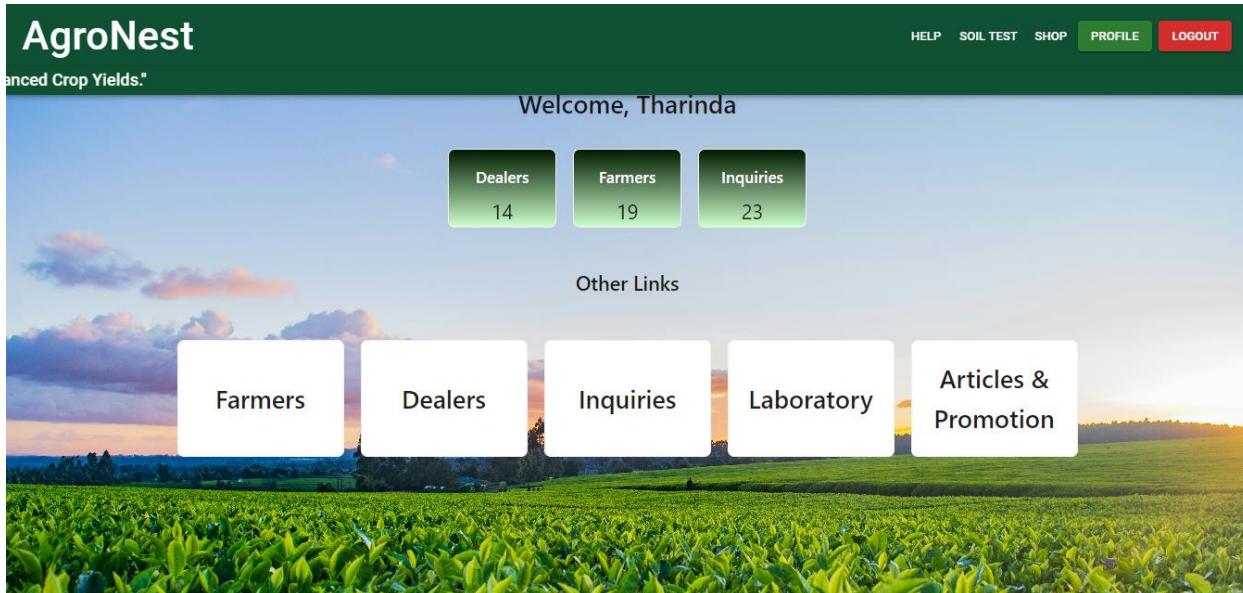
The screenshot shows a web browser window for 'AgroNest' at localhost:3000/addarticle. The title bar says 'localhost:3000/addarticle'. The header includes 'AgroNest' logo, 'HELP', 'SOIL TEST', 'SHOP', 'PROFILE' (green), and 'LOGOUT' (red). Below the header is a large green banner with the text 'We are here to help you grow your business'. The main content area has a blue header 'Add New Article'. It contains a 'Title' input field and a larger 'Content' input field. To the right of the content field are two small icons: a location pin and a circular arrow. At the bottom right is a blue 'ADD' button.

The screenshot shows a web browser window for 'AgroNest' at localhost:3000/addarticle. The title bar says 'localhost:3000/addarticle'. The header includes 'AgroNest' logo, 'HELP', 'SOIL TEST', 'SHOP', 'PROFILE' (green), and 'LOGOUT' (red). Below the header is a large green banner with the text 'We are here to help you grow your business'. The main content area has a blue header 'Past Articles'. It features a search bar with 'Search' and a magnifying glass icon. Below the search bar is a list of articles. The first article is titled 'A Comprehensive Guide to Fertilizer Usage for Farmers' with a timestamp '5/6/2024, 3:22:58 PM'. The article content discusses the importance of fertilizer usage for crop yield and quality, mentioning different types of fertilizers (organic and inorganic) and application methods like broadcasting, banding, or fertigation. It emphasizes the need for proper timing and monitoring to avoid nutrient imbalances and environmental pollution. The article concludes by noting the role of precision agriculture, remote sensing, and soil mapping in improving fertilizer efficiency and yields. At the bottom right of the article card is a blue 'UPDATE' button.

The screenshot shows a web browser window with the URL localhost:3000. The page has a dark green header with the logo "AgroNest". In the top right corner, there are links for "HELP", "SOIL TEST", "SHOP", "PROFILE" (in a blue box), and "LOGOUT" (in a red box). Below the header, a banner reads: "Fertilizer Management System. Explore our innovative fertilizer solutions and promote sustainable agriculture practices." A text block discusses the impact of chemical fertilizers on soil health and the importance of responsible management. A blue "DOWNLOAD PDF" button is present. The main content area features a section titled "Synthetic fertilizers" with a timestamp of "5/6/2024, 8:49:36 AM". It contains a detailed paragraph about the history and types of synthetic fertilizers, mentioning elements like nitrogen, phosphorus, and potassium. Another blue "DOWNLOAD PDF" button is located below this section.

The screenshot shows a web browser window with the URL localhost:3000. The header is identical to the previous screenshot, featuring the "AgroNest" logo and navigation links. Below the header, a banner reiterates the mission to explore innovative fertilizer solutions and promote sustainable agriculture. The main content area is titled "Articles" in large green text. A search bar labeled "Search by Heading" is positioned above a list of article thumbnails. A dropdown menu labeled "SORT BY Date" is visible. One thumbnail shows a tractor spraying a field, while others are partially obscured by gray rectangles.

Manage Admin Dashboard



AgroNest

The screenshot shows the AgroNest laboratory management interface. At the top, there is a navigation bar with "HELP", "SOIL TEST", "SHOP", "PROFILE" (highlighted in green), and "LOGOUT". Below the navigation bar, a banner states "AgroNest - Leading the Way in Fertilizer Management Solutions for Sustainable Farming Practices and Enhanced". On the left, a sidebar lists "Profile", "Dealers", "Farmers", "Laboratory", "Inquiries", "Articles", and "Promotion". The main area features a "Total Labs: 19" summary with a "VIEW" button. Below this, there are ten cards numbered 1 to 10, each representing a laboratory or user profile. Each card has a green "VIEW" button. The cards are arranged in two rows: Row 1 contains cards 1, 2, 3, and 4; Row 2 contains cards 5, 6, 7, 8, and 9. The background of the main area is a scenic view of a green field under a blue sky with clouds. At the bottom right of the main area, there are buttons for "GENERATE PDF", "EXPORT ALL LABS", and "FILTER".

 Profile

Dealers

Farmers

Laboratory

Inquiries

Articles

Promotion

DEALER

FARMER

PENDING RESOLVED

Name	Topic	Description	Status	Actions
rahul@gmail.com	Warranty Information Request	I have been selling your products to customers and have received inquiries about warranties. Could you please provide detailed information on the warranty coverage for your products? This information would be helpful for both myself and my customers. Thank you.	Resolved	VIEW
rahul@gmail.com	Product Demonstration Request	Our dealership is interested in hosting a product demonstration event for your latest offerings. This event would allow potential customers to experience your products firsthand. I would like to discuss the logistics and availability of your team for this event. Thank you.	Resolved	VIEW
rahul@gmail.com	Marketing Collateral Request	I am in need of marketing collateral such as brochures and posters to promote your products in our dealership. Could you please provide the necessary materials and information on any marketing support programs available for dealers? Thank you.	Resolved	VIEW
	InVENTORY DROPOUT	Our dealership is running low on inventory for your products and require a restock. Could you please provide information on the		



AgroNest

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 Profile

Dealers

Farmers

Laboratory

Inquiries

Articles

Promotion

PENDING RESOLVED

rahul@gmail.com

Topic: Farm Management Software

Description: I'm interested in implementing farm management software solutions to streamline operations, improve efficiency, and enhance decision-making on the farm. I need recommendations on farm management software platforms, features, and integration with other digital tools for data management and analysis.

Area: Kandy

Status: Pending

[Reply](#)[SEND](#)[CLOSE](#)

FARMER

Area Status Actions

Kandy Pending [VIEW](#)Kandy Pending [VIEW](#)

Feedback and Inquiry Management

The image displays two screenshots of the AgroNest web application interface.

Top Screenshot: A screenshot of the "Submit Inquiry" page. The URL is `localhost:3000/formPage?category=Farmer`. The page has a green header with the AgroNest logo and navigation links: HELP, SOIL TEST, SHOP, PROFILE (highlighted in green), and LOGOUT. Below the header, a large "Submit Inquiry" button is visible. The main form includes fields for E-mail, Category (selected as "Farmer"), Area, Topic*, and Description*. There are three numbered steps at the top: 1. Select Category (checkmark), 2. Fill the Inquiry Form, and 3. Submit to the system.

Bottom Screenshot: A screenshot of the "farmerInquiry" page. The URL is `localhost:3000/farmerInquiry`. The page features a large "AgroNest" logo. The header is identical to the top screenshot. The main content area displays a welcome message: "Welcome to AgroNest Support Services !". Below this, there are two tabs: "PENDING" (with 11 notifications) and "RESOLVED" (with 2 notifications). Under the "PENDING" tab, there is a search bar and a table of pending issues:

Topic	Action
Topic: Crop Yield Improvement	<button>VIEW</button>
Topic: Organic Fertilizer Recommendation	<button>VIEW</button>
Topic: Pest Control Strategies	<button>VIEW</button>
Topic: Irrigation System Installation	<button>VIEW</button>
Topic: Crop Rotation Plan	<button>VIEW</button>

AgroNest

"Welcome to Our Fertilizer Management System. Explore our innovative fertilizer solutions and promote sustainable agriculture practices."

Customer Feedbacks

Total Feedbacks: 13

1 ★☆☆☆☆ Poor
5 ★★★★☆ OK
1 ★★★☆☆ Average
2 ★★★★☆ Good
4 ★★★★★ Excellent

Ratings Distribution

Rating	Count
1	1
2	5
3	1
4	2
5	4

Item Code: 12345
Order ID: btr
Farmer Name: btr2
Rating: ★☆☆☆☆
bt2r2v2r2v2r2fe2vf

Item Code: 12345
Order ID: htw
Farmer Name: wbtbtbw
Rating: ★★☆☆☆
wtbtbtne5bh w4g3yj5

Item Code: 12345
Order ID: az
Farmer Name: wcq
Rating: ★★★★★
zqwnq

Item Code: 12345
Order ID: vc vc
Farmer Name: vc
Rating: ★★★★★
vcvc

VIEW DETAILS **VIEW DETAILS** **VIEW DETAILS** **VIEW DETAILS**

AgroNest

"Welcome to Our Fertilizer Management System. Explore our innovative fertilizer solutions and promote sustainable agriculture practices."

My Reviews

Make Valuable Decisions With Past Reviews !

Item Code	Rating	Icon
12345	1	:(
12345	2	:)
12345	3	:-)

Item Code: 12345
Rating: 1

Item Code: 12345
Rating: 2

Item Code: 12345

Order Management

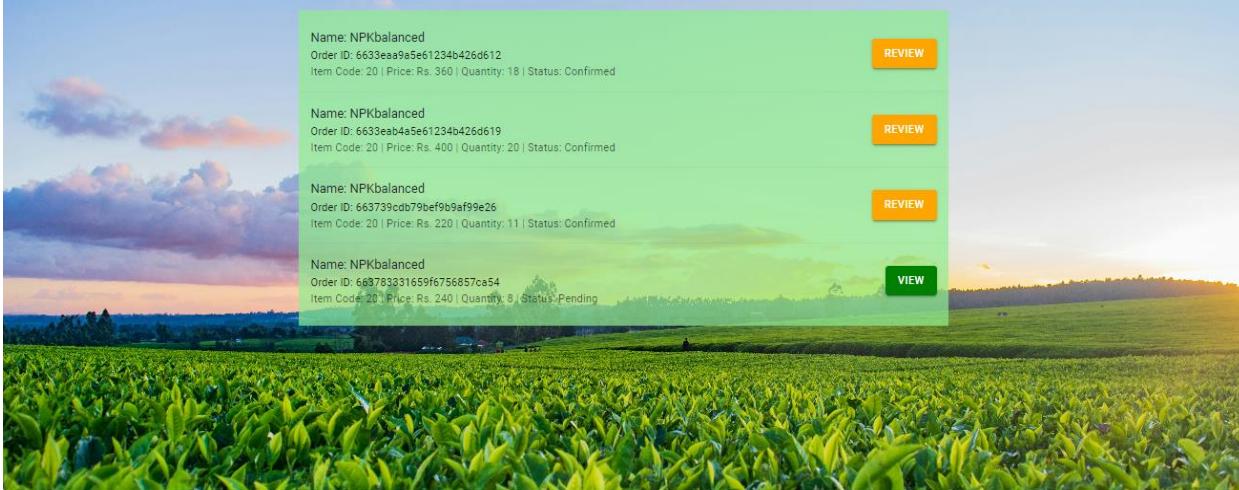
The screenshot shows the AgroNest homepage. At the top, there's a navigation bar with links for HELP, SOIL TEST, SHOP, PROFILE (highlighted in green), and LOGOUT. Below the navigation is a banner with the text "Empowering Agriculture: Ag". The main content area features a grid of fertilizer products against a background of a green field at sunset. The products shown are NPKprime, NPKbalanced, MOP, TSP, Urea, and Recovery. A search bar labeled "Search items" is located at the top left. The URL "localhost:3000/item/663d17a5dfc54f997d43947e" is visible at the bottom left of the page.

AgroNest

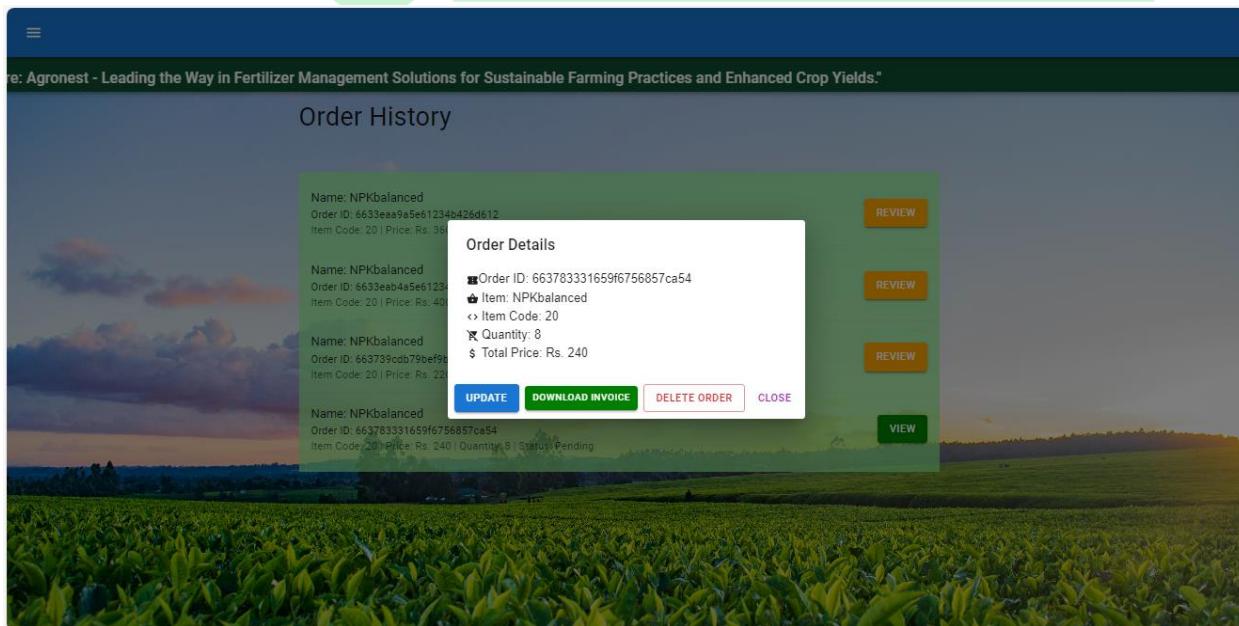
FUTURE OF AGRICULTURE.

This screenshot shows a product detail page for "NPKprime" vermicompost. The product image is a bag of "VERMI COMPOST" labeled "100% Virgin Vermicompost". The page includes the item code (10), price (Rs. 10), available quantity (80), and a quantity selector set to 1. The total price is listed as Rs. 10. There are buttons for "BUY NOW" and "Money-back guarantee". Accepted payment methods are listed as Visa and Mastercard. The background of the page is a scenic view of a green field under a cloudy sky.

Order History



AgroNest



BACKEND FOLDER STRUCTURE



Figure 6-29 BACKEND FOLDER STRUCTURE

FRONTEND FOLDER STRUCTURE

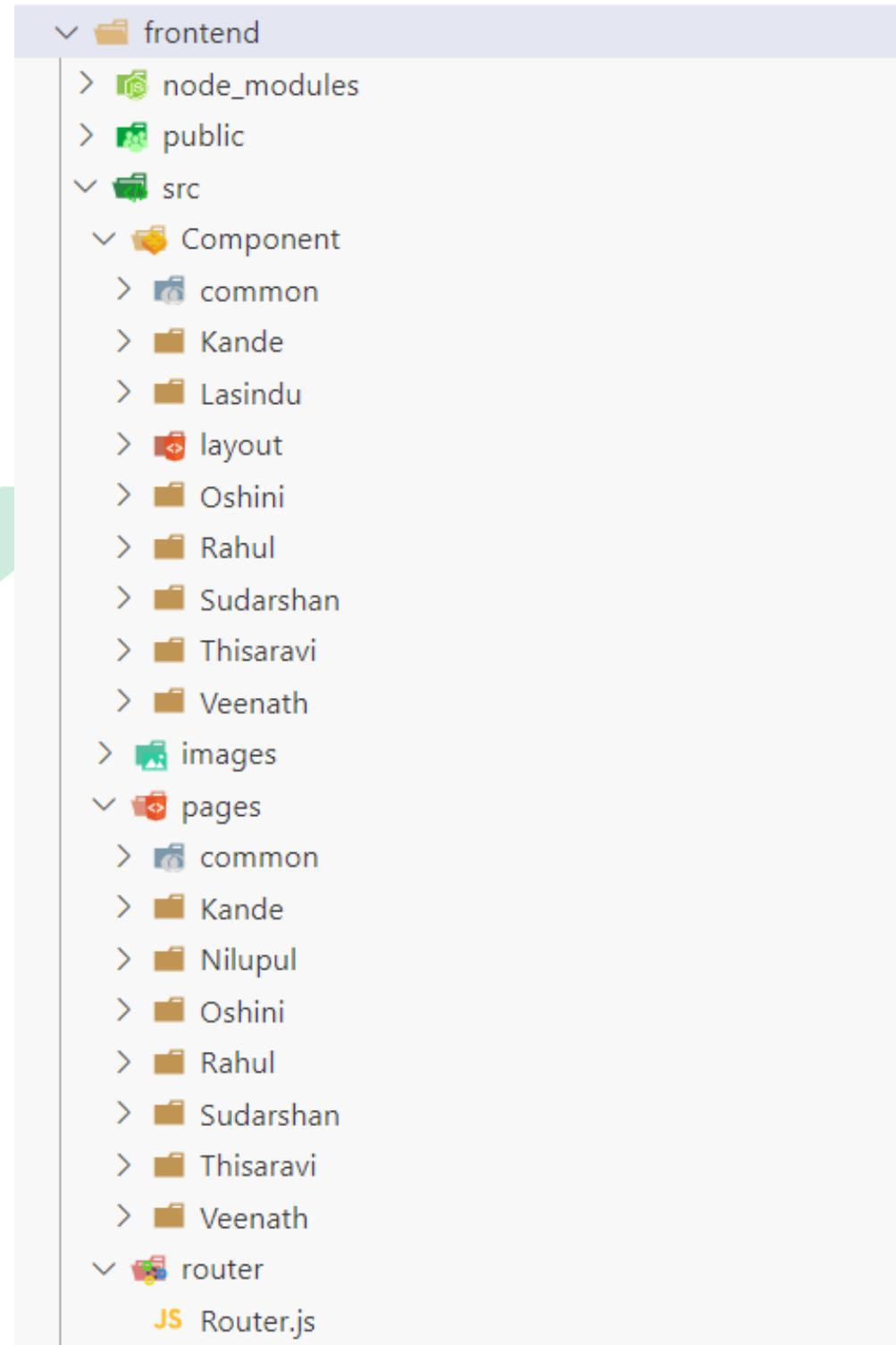


Figure 6-30 FRONTEND FOLDER STRUCTURE

DATABASES

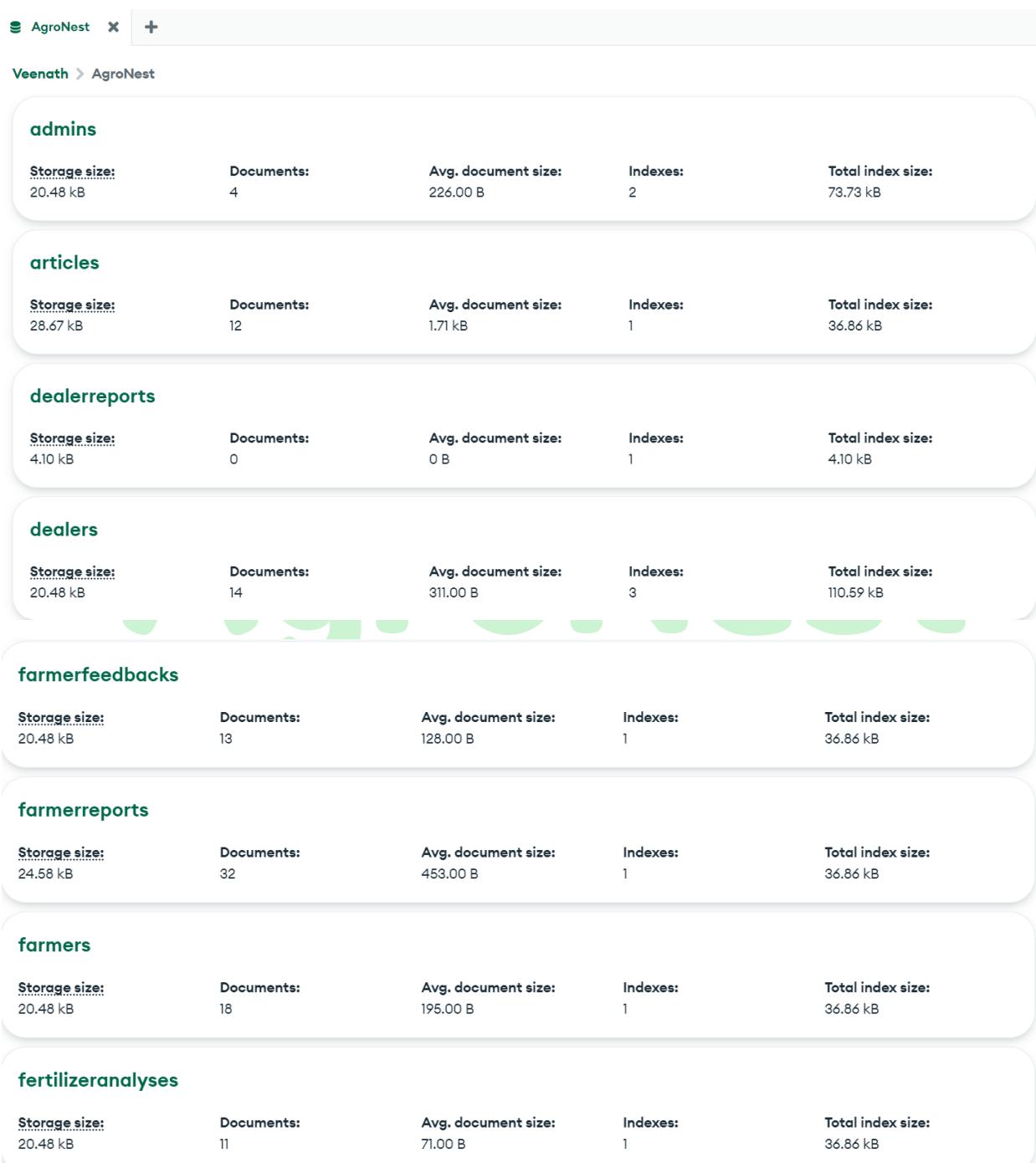


Figure 6-31 DATABASES.

DEVELOPMENT ASPECTS

FMS - Development Aspects

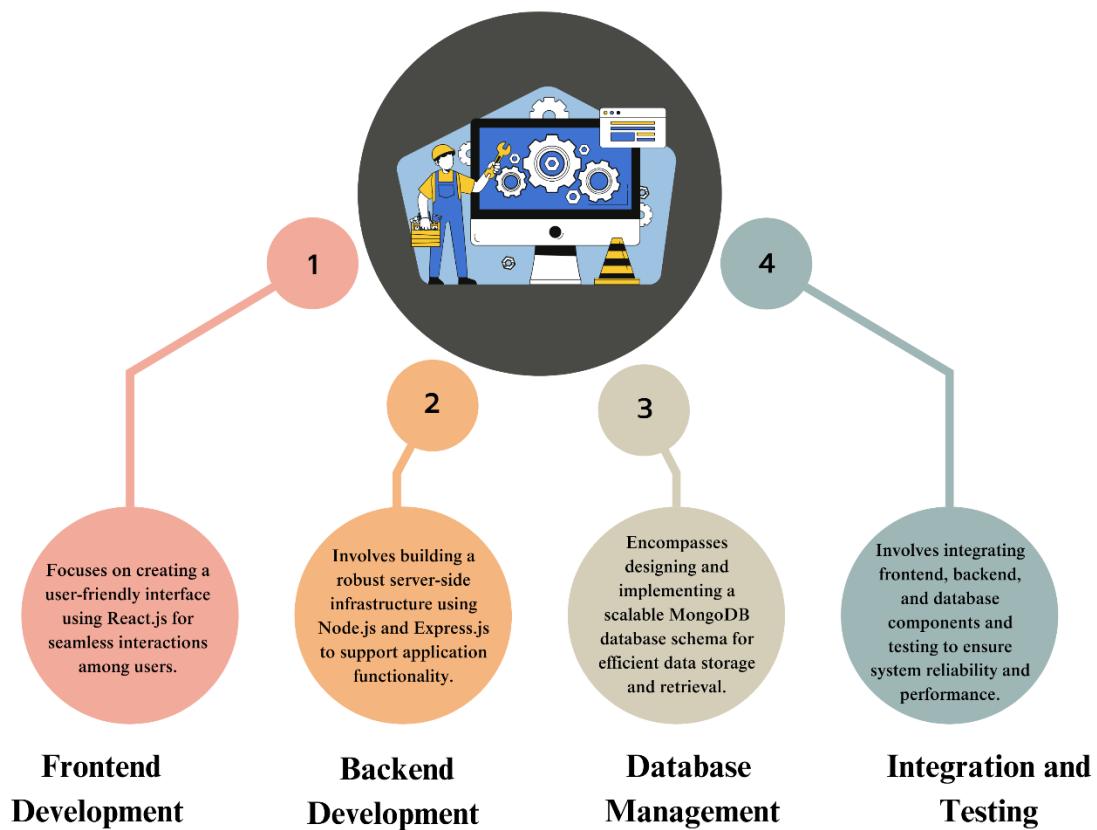


Figure 6-32 DEVELOPMENT ASPECTS

Our project comprises four main development aspects: front-end development with React.js for user interface, backend development using Node.js and Express.js, MongoDB for database management, and integration/testing for system reliability.

CHAPTER - 4

TESTING

TEST CASES AND RESULTS

Fertilizer Inventory Management

Table 8.1 Fertilizer Inventory Management test case

Project ID: : ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Add a new fertilizer listing to the inventory	
Test ID: Test_001	Test case designed and executed by: Reg No. Name – Dayarathna W.S.R.
Test Priority	High
Test Description: Add a new fertilizer to the inventory/ virtual shop by the fertilizer dealer.	
Pre-Conditions: Dealer must be a registered dealer & must be sign in to the system Dealer should go to his profile and navigate to the manage shop section.	
Test Steps: Step 1: Login to the system and navigate to the Manage Shop page. Step 2: Select the required fertilizer from the fertilizer dropdown. Step 3: Enter the item code. Step 4: Enter the fertilizer selling price. Step 5: Enter the fertilizer available quantity. Step 6: Click on “Add Product” button.	
Pass-Conditions: New fertilizer successfully added to the fertilizer inventory.	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass / Fail)	Comment
Test_001 a	<p>1.Fertilizer adding form filled with valid information:</p> <p>Fertilizer name: NPK Balanced</p> <p>Item code: 1001</p> <p>Price: 1800</p> <p>Quantity: 5000</p> <p>2. Click “Add Product” button</p>	<p>A successful fertilizer adding confirmation message</p> <p>Refreshing the page to view added fertilizer.</p> <p>View the fertilizer in the view section</p>	<p>A successful fertilizer adding confirmation message</p> <p>Refreshing the page to view added fertilizer.</p> <p>View the fertilizer in the view section</p>	Pass	Successfully added the fertilizer without errors
Test_001 b	<p>1.Fertilizer adding form filled with valid information:</p> <p>Fertilizer name: NPK Balanced</p> <p>Item code: 1001</p> <p>Price: 1800</p> <p>Quantity: 5000</p> <p>2. Click “Add Product” button</p>	<p>A successful fertilizer adding confirmation message</p> <p>Refreshing the page to view added fertilizer.</p> <p>View the fertilizer in the view section</p>	<p>Error messages displayed indicating that the chosen Fertilizer and item code that is already in the system.</p> <p>Adding fertilizer is not successful.</p>	Fail	Cannot add fertilizer with the same name and item code again.
Test_001 c	<p>1.Fertilizer adding form filled with valid information:</p> <p>Fertilizer name: NPK Prime</p> <p>Item code: 1002</p> <p>Price: -1</p> <p>Quantity: 0</p>	<p>A successful fertilizer adding confirmation message</p> <p>Refreshing the page to view added fertilizer.</p> <p>View the fertilizer in the view section</p>	<p>Error messages displayed indicating that the quantity and the price must be positive.</p> <p>Adding fertilizer is not successful.</p>	Fail	Cannot add fertilizers with negative or zero quantity or price values.

	2. Click “Add Product” button				
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Dealer Registration

Table 8.2 Dealer Registration test case

Project ID: : ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Register to the system as a new dealer	
Test ID: Test_002	Test case designed and executed by: Reg No. Name – Dayarathna W.S.R.
Test Priority	High
Test Description: Register to the system as a new fertilizer dealer. Then the dealers can sell their products to the farmers.	
Pre-Conditions: Dealer should go to the dealer registration page.	
Test Steps: Step 1: Navigate to the dealer sign up page. Step 2: Enter the username Step 3: Enter the phone number Step 4: Enter the name Step 5: Enter the store district Step 6: Enter the address Step 7: Enter the email. Step 8: Enter the password. Step 9: Re-enter the password. Step 10: Click on “Sign Up” button.	
Pass-Conditions: New dealer successfully registered to the system.	

Test ID	Test Inputs	Expect Output	Actual Output	Result	Comment
Test_002 a	<p>1. Dealer registration form filled with valid information:</p> <p>Username: sudarshana</p> <p>Name: sudarshana</p> <p>Phone: 0764589632</p> <p>Store district: Balangoda</p> <p>Address: balangoda</p> <p>Email: sudarshana@gmail.com</p> <p>Password: 1234</p> <p>Re-entered pw: 1234</p> <p>2. Click “Sign Up” button</p>	<p>A successful dealer registration confirmation message</p> <p>Redirecting the dealer to the login page</p>	<p>A successful dealer registration confirmation message</p> <p>Redirecting the dealer to the login page</p>	Pass	Succesfully registered the dealer without errors
Test_002 b	<p>1. Dealer registration form filled with valid information:</p> <p>Username: sudarshana</p> <p>Name: sudarshana</p> <p>Phone: 0764589632</p> <p>Store district: Balangoda</p> <p>Address: balangoda</p> <p>Email: sudarshana@gmail.com</p> <p>Password: 1234</p> <p>Re-entered pw: 1234</p> <p>2. Click “Sign Up” button</p>	<p>A successful dealer registration confirmation message</p> <p>Redirecting the dealer to the login page</p>	<p>Error messages displayed indicating that the username or the email that is already in the system.</p> <p>Registering the dealer is not successful.</p> <p>No redirecting the to the login page.</p>	Fail	Cannot register dealers with the same user name and email again.
Test_002 c	<p>1. Dealer registration form filled with valid information:</p> <p>Username: lasindu</p> <p>Name: lasindu</p> <p>Phone: 1234</p>	<p>A successful dealer registration confirmation message</p>	<p>Error messages displayed indicating that the phone number is not valid and passwords are not matching.</p>	Fail	Cannot register dealers invalid phone numbers or

	Store district: Balangoda Address: balangoda Email: lasindu@gmail.com Password: 1234 Re-entered pw: 1111 2. Click “Sign Up” button	Redirecting the dealer to the login page	Registering the dealer is not successful. No redirecting the to the login page.		unmatching password and re-entered password fields.
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System Data Analysis

Table 8.3 System Data Analysis test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: System Manager Account Access – System Manager Sign in	
Test case ID: Test_061	Test case designed and executed by: Reg. No FUTUTURE OF AGRICULTURE. Name – Kandage T P
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether System manager sign in to the system successfully.	
Preconditions: System manager should have access to the system.	
Test Steps: <ol style="list-style-type: none"> 1. Open the login page of the system. 2. Enter the system manager's username and password. 3. Click on the "Log In" button. 4. Verify that the system redirects the manager to the dashboard or home page. 5. Confirm that the manager's account details and permissions are correctly displayed. 6. Ensure that the manager can access and navigate through the system's features without any errors. 	

- **Pass-conditions:** The system manager is logged in to their account and can proceed with their tasks within the system.

Test ID	Test Inputs	Expected Outputs	Actual Output	Result	Comment
Test_041	<p>Add Top Fertilizer Category to System</p> <p>Name: Agronest Fertilizer data Analysis</p> <p>Address: Malabe</p> <p>Phone: 0717445943</p> <p>District: Colombo</p> <p>City: Malabe</p> <p>Username: thisara</p> <p>Password: ***</p>	<p>1. Log in to account successfully</p> <p>2. Redirect to the manager Dashboard page.</p> <p>3. When logging into the system, the system manager will navigate to the login page and input their valid credentials. Upon clicking the 'Log In' button, the system will process the login request. Once verified, the system manager will be redirected to the dashboard or home page, where their account information and privileges will be accurately displayed. The system manager will then have access to relevant functionalities and features without encountering any errors or unexpected behaviors during the login process.</p>	<p>1. Error messages for validations persist until the correct values are entered.</p> <p>2. An alert appears confirming the successful login.</p> <p>3. Automatic redirection to the dashboard or home page occurs upon successful login.</p>	Pass	<p>1. Validation checks are operating successfully.</p> <p>2. Alert notifications are being displayed effectively.</p> <p>3. The database has been updated with the new record, confirming successful account creation.</p> <p>4. Successfully navigated to the login page after completing the task.</p>

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Find Top Fertilizer categories and enter to system	
Test case ID: Test_062	Test case designed and executed by: Reg. No Name – Kandage T P
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether Top fertilizer categories which are in the order database.	
Preconditions: System manager should log in to the system.	
Test Steps: <ol style="list-style-type: none"> 1. Log in to the system manager interface. 2. Access fertilizer categories in the database. 3. Retrieve top fertilizer categories. 4. Display fetched data on the dashboard. 5. Identify top fertilizers within categories. 6. Enter new fertilizer data. 7. Save the new data. 8. Manage existing data through CRUD operations. 9. Ensure successful reflection of changes in the system. 	
Pass-conditions: After the status of the test request is updated successfully, request will be moved to the relevant category and the number of test requests in each category under the same fertilizer data will be updated according to the change.	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result	Comment
Test_042	Change the status of the test request.	1. Status of the request should be changed from “Accepted” to “Completed” successfully.	1. Test request moved to the completed page successfully.	Pass	1. Database record of the test request is updated with

	<p>Current status: Accepted</p> <p>Updated Status: Completed</p> 	<p>2. Request should be moved to the “Completed” page.</p> <p>3. Number of completed requests of the relevant laboratory should be incremented.</p> <p>When changing the status of test request, lab assistant has to go to Accepted requests page, the go to the specific request, and select “Completed” from the dropdown of that test request. Then the request will be moved to completed page and the number of completed test requests of that lab will be updated.</p>	<p>2. Number of completed test requests in the database was incremented by 1.</p>		<p>the newly assigned status.</p> <p>2. Laboratory record is updated and the new number of completed requests are inserted to the record successfully.</p>
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Article and Promotion Management

Table 8.4 Article & Promotion Management – Article Publishing test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Article & Promotion Management – Article Publishing	
Test case ID: Test_032	Test case designed and executed by: Reg. No Name – G D G N PERERA
Test Priority (High/Medium/Low):	High
Test Description: This test case will verify the functionality of publishing articles by the company admin. It will ensure that articles can be uploaded with relevant information and associated with appropriate categories.	
Preconditions: Company admin should have access to the system.	
Test Steps: Step 1: Company admin accesses the website. Step 2: Navigate to the "Article and Promotion Management" section. Step 3: Click on the “Publish Article” option. Step 4: Fill in the required information such as title, content, category, and upload related images or videos. Step 5: Click the "Publish" button. Step 6: Verify that the article is successfully published and displayed in the list of articles.	
Pass-conditions: After publishing, the article should be visible in the list of articles and accessible to users for download.	

Test ID	Step No.	Test Inputs	Expected Output	Actual Output	Pass/Fail	Comment
Test_032	1	Company admin accesses the website.	Website is accessible.	Website is accessible.	Pass	-
	2	Navigate to the "Article and Promotion Management" section.	The section is accessible.	The section is accessible.	Pass	-
	3	Click on "Publish Article" option.	The option is clickable.	The option is clickable.	Pass	-
	4	Fill in the required information.	Information is entered correctly.	Information is entered correctly.	Pass	-
	5	Click the "Publish" button.	Article is published successfully.	Article is published successfully.	Pass	Article published successfully.
	6	Verify that the article is displayed in the list of articles.	Article is visible in the list of articles.	Article is visible in the list of articles.	Pass	-

Table 8.5 Article & Promotion Management – Article Updating and Deleting test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Article & Promotion Management – Article Updating and Deleting	
Test case ID: Test_033	Test case designed and executed by: Reg. No Name – G D G N PERERA
Test Priority (High/Medium/Low):	High
Test Description: This test case ensures that company admin can update and delete articles. It checks if the system allows for modifications and removal of articles without issues.	
Preconditions: Company admin should have access to the system. There should be at least one existing article.	
Test Steps: <ul style="list-style-type: none"> Step 1: Company admin accesses the website. Step 2: Navigate to the "Article and Promotion Management" section. Step 3: Select an existing article to update or delete. Step 4: For updating: <ul style="list-style-type: none"> Click on the "Edit" option. Modify the article content or details. Click the "Save Changes" button. Verify that changes are reflected in the article. Step 5: For updating: <ul style="list-style-type: none"> Click on the "Delete" option. Confirm the deletion. Ensure that the article is removed from the system. 	
Pass-conditions: <ul style="list-style-type: none"> For updating: After saving changes, the article should reflect the modifications. For deleting: The article should be successfully deleted from the system. 	

Test ID	Step No.	Test Inputs	Expected Output	Actual Output	Pass/Fail	Comment
Test_033	1	Company admin accesses the website.	Website is accessible.	Website is accessible.	Pass	-
	2	Navigate to the "Article and Promotion Management" section.	The section is accessible.	The section is accessible.	Pass	-
	3	Select an existing article to update or delete.	Article is selected.	Article is selected.	Pass	-
	4	For updating:				
		- Click on the "Edit" option.	Edit option is clickable.	Edit option is clickable.	Pass	-
		- Modify the article content or details.	Changes are made correctly.	Changes are made correctly.	Pass	-
		- Click the "Save Changes" button.	Changes are saved successfully.	Changes are saved successfully.	Pass	Changes saved successfully.
	5	For deleting:				
		- Click on the "Delete" option.	Delete option is clickable.	Delete option is clickable.	Pass	-
		- Confirm the deletion.	Article is deleted successfully.	Article is deleted successfully.	Pass	Article deleted successfully.

Soil Quality Management

Table 8.6 Farmer Profile Handling – Farmer Sign Up test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Farmer Profile Handling – Farmer Sign Up	
Test case ID: Test_031	Test case designed and executed by: Reg. No Name – Thisaravi R.D.H
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether a farmer creates an account and sign up successfully on the system.	
Preconditions: A farmer accesses the sign-up page of the system.	
Test Steps: Step 1: Farmer accesses the homepage of the website as a visitor. Step 2: Press “Sign Up” from navigation bar. Step 3: Select “Farmers” from sign up options. Step 4: Fill in the required fields to create an account. Step 5: Check whether there are any validation errors. If so, correct the errors. Step 6: Click “Sign Up” button. Step 7: If the farmer account is created successfully, farmer automatically redirected to the login page.	
Pass-conditions: Farmer is automatically redirected to the login page if the farmer sign up successfully in the system.	

Test_031	<p>Farmer sign up to the system.</p> <p>First Name: Alex</p> <p>Last Name: Fernando</p> <p>Email: AlexF456@gmail.com</p> <p>Phone: 0717896542</p> <p>District: Colombo</p> <p>City: Nugegoda</p> <p>Username: Alex12</p> <p>Password: *****</p>	<p>1.Successfully create a farmer account without validation errors.</p> <p>2. Redirect to login page.</p>	<p>1.Error messages of validations displayed until the correct values were entered.</p> <p>2.Automatically redirected to the login page.</p>	Pass	<p>1. Validations are working successfully.</p> <p>3. Database is updated with the new record and account creation was successful.</p> <p>4. Successfully redirected to login page.</p>
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Table 8.7 Soil Quality Management– Soil test request submission test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Soil Quality Management– Soil test request submission	
Test case ID: Test_032	Test case designed and executed by: Reg. No Name – Thisaravi R.D.H
Test Priority (High/Medium/Low):	Medium
Test Description: This test case will verify whether a farmer can successfully initiate a soil test request through the platform.	
Preconditions: A farmer is logged into the system with valid credentials and has navigated to the soil test request section of the platform.	
Test Steps: <ul style="list-style-type: none"> Step 1: Farmer navigates to soil test services page of the website. Step 2: Select “Request for a soil test” and navigate to the request form. Step 3: Fill out the required fields in the form including the test type, crop type, date to handover the soil sample, laboratory, etc. Step 4: Submit the soil test request by clicking the “submit” button. Step 5: The Farmer automatically redirects to the pending requests view page. Step 6: Farmer can view, update, or delete the pending request as he wants. 	
Pass-conditions: The soil test request is visible to the farmer and can be tracked in the “Pending Requests” section.	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_032	<p>Soil test request submitted successfully.</p> <p>Soil Test Type: PH level</p> <p>Crop Type: Tea</p> <p>Date: 2024-05-18</p> <p>District: Puttalam</p> <p>City: Wennappuwa</p> <p>Laboratory: labID</p> <p>Status: Pending</p>	<p>1. Dashboard displays the soil test services.</p> <p>2. Display Request form when click on the relevant button.</p> <p>3. All required fields are correctly filled out with the correct information.</p> <p>4. Retrieve the laboratory which matches with the district and city farmer selected.</p> <p>5. Soil test request is successfully submitted.</p>	<p>1. Request form successfully submitted.</p> <p>2. Retrieve the laboratory which matches with the district and city farmer selected.</p> <p>3. Automatically redirected to Pending requests page.</p>	Pass	<p>1. Farmers can select only future dates.</p> <p>3. Database is updated with the new record and request submitted successfully.</p> <p>4. Successfully redirected pending request list.</p>

Laboratory Management

Table 8.8 Laboratory Account Handling – Laboratory Sign Up test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Laboratory Account Handling – Laboratory Sign Up	
Test case ID: Test_041	Test case designed and executed by: Reg. No Name – Mihindukulasuriya O.S
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether a laboratory is able to create an account and sign up to the system successfully.	
Preconditions: Laboratory should have access to the system.	
Test Steps: Step 1: Laboratory access the website. Step 2: Press “Sign Up” from navigation bar. Step 3: Select “Laboratories” from sign up options. Step 4: Fill the relevant data to create an account. Step 5: Check whether there are any validation errors. If so, correct the errors Step 6: Click “Sign Up” button. Step 7: If the laboratory account is created successfully, “Sign Up is successful” message will be displayed. Step 8: Laboratory will be automatically redirected to the Login page.	
Pass-conditions: After a laboratory account is created successfully, an alert will inform that the sign up is successful. Otherwise, an error message will be displayed.	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_041	<p>Add a laboratory to the system.</p> <p>Name: Soil Test Laboratories</p> <p>Address: Main Road, Maharagama</p> <p>Phone: 0717896542</p> <p>District: Colombo</p> <p>City: Maharagama</p> <p>Username: Oshini</p> <p>Password: ****</p>	<p>1. Create a lab account successfully.</p> <p>2. Redirect to login page.</p> <p>When creating a laboratory account, lab assistant has to provide all the required details. Assistant will be able to submit the details once all the validations are satisfied. After submitting, an alert will be displayed mentioning that a laboratory account is created successfully. Then lab assistant will be redirected to the login page.</p>	<p>1. Error messages of validations displayed until the correct values were entered.</p> <p>2. Alert is displayed mentioning the account creation is successful.</p> <p>3. Automatically redirected to the login page.</p>	Pass	<p>1. Validations are working successfully.</p> <p>2. Alert messages are displaying successfully.</p> <p>3. Database is updated with the new record and account creation was successful.</p> <p>4. Successfully redirected to login page.</p>

Table 8.9 Test Request Handling – Changing the Status test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Test Request Handling – Changing the Status	
Test case ID: Test_042	Test case designed and executed by: Reg. No Name – Mihindukulasuriya O.S
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether a laboratory is able to change the status of the test requests successfully.	
Preconditions: Laboratory should login to the system.	
Test Steps: <ul style="list-style-type: none"> Step 1: Laboratory logs in to the system using the relevant username and password. Step 2: Test requests raised for the laboratory is displayed in 3 categories, “Pending”, “Accepted” and “Completed”. Step 3: Select relevant test category. Step 4: Navigate to dropdown indicating the current status and the status that can be assigned. Step 5: Select the status that should be assigned to the test request from the dropdown. Step 6: If the status change is successful, test request will be moved to the newly assigned category. Step 7: Number of test requests in each category under the relevant lab will be updated according to the change. 	
Pass-conditions: After the status of the test request is updated successfully, request will be moved to the relevant category and the number of test requests in each category under the same laboratory will be updated according to the change.	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_042	<p>Change the status of the test request.</p> <p>Current status: Accepted</p> <p>Updated Status: Completed</p>	<p>1. Status of the request should be changed from “Accepted” to “Completed” successfully.</p> <p>2. Request should be moved to the “Completed” page.</p> <p>3. Number of completed requests of the relevant laboratory should be incremented.</p> <p>When changing the status of test request, lab assistant has to go to Accepted requests page, the go to the specific request, and select “Completed” from the dropdown of that test request. Then the request will be moved to completed page and the number of completed test requests of that lab will be updated.</p>	<p>1. Test request moved to the completed page successfully.</p> <p>2. Number of completed test requests in the database was incremented by 1.</p>	Pass	<p>1. Database record of the test request is updated with the newly assigned status.</p> <p>2. Laboratory record is updated and the new number of completed requests are inserted to the record successfully.</p>

Table 8.10 Test Request Handling – Uploading the Lab Report test case.

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Test Request Handling – Uploading the Lab Report	
Test case ID: Test_043	Test case designed and executed by: Reg. No Name – Mihindukulasuriya O.S
Test Priority (High/Medium/Low):	High
Test Description: This test case will check whether a laboratory is able to upload the lab report of the relevant completed test request successfully.	
Preconditions: Laboratory should login to the system.	
Test Steps: <ul style="list-style-type: none"> Step 1: Laboratory logs in to the system using the relevant username and password. Step 2: Test requests raised for the laboratory is displayed in 3 categories, “Pending”, “Accepted” and “Completed”. Step 3: Select completed test category. Step 4: Press “Upload” button in the relevant test request that the lab report needed to be uploaded. Step 5: Laboratory will be navigated to upload lab report page. Step 6: Enter the title of the lab report in the given text field. Step 7: Drag and drop the lab report to the container or press “Browse” button to select the pdf documents from the device. Step 8: If the laboratory wants to view the pdf before uploading, laboratory can click on the pdf and it will be displayed in new tab. Step 9: If the laboratory needs to remove the selected document, press “Remove” button displayed near the selected document. Step 10: Press “Upload” button to upload the lab report. Step 11: If the document is uploaded successfully, a message will be displayed mentioning the lab report is uploaded successfully. Step 12: Laboratory will be redirected to the completed requests page. 	

Pass-conditions: After the lab report is uploaded successfully, an alert will be displayed mentioning that the report is added successfully, and the laboratory will be redirected to the completed requests page.

Test ID	Test Inputs	Expected Outputs		Actual Output	Result (Pass/Fail)	Comment
Test_043	<p>Upload the lab report to the relevant test request.</p> <p>Title: Lab Report 1</p> <p>Report: Lab Report 1.pdf</p> <p>When uploading the lab report of a specific request, lab assistant has to navigate to completed requests page, and press the upload button of the request. Then he will be navigated to the upload lab report page. After entering the title and selecting the lab report to</p>	<p>1. Alert should be displayed mentioning that the report is submitted successfully.</p> <p>2. Laboratory should be redirected to the completed requests page.</p>		<p>1. An alert was displayed mentioning the submission was successful.</p> <p>2. Automatically redirected to completed requests page.</p>	Pass	<p>1. Uploaded file is saved in the “Uploads” folder successfully.</p> <p>2. New record is added to the database with the file name, file path and the request ID.</p>

		upload, assistant has to press submit. Then an alert will be displayed mentioning the successful submission of the lab report and assistant will be redirected to the completed requests page.				
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Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Administrator- Logging to the system	
Test case ID: Test_051	Test case designed and executed by: Reg. No Name – Rahul N.W.P.G.T.T
Test Priority (High/Medium/Low):	High
Test Description: To verify that the administrator can log in to their account successfully using their email and password.	
Preconditions: The administrator has been assigned with valid login credentials	

Test Steps:

1. Open the login page of the system.
2. Enter the administrator's email into the given email field.
3. Enter the administrator's password into the given password field.
4. Click on the "Log In" button.
5. Verify that the system redirects the administrator to the dashboard.
6. Confirm that the administrator's name is displayed on the dashboard.
7. Check that the administrator's account details are correctly displayed.
8. Confirm that administrator can access and navigate through the system's features without any errors.

- **Pass-conditions:** administrator should be able to log in successfully without encountering any errors.
- All system features relevant to the administrator's role should be accessible without issues.



Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_0 51.a	User Name = Tharinda Password = tharinda.	1. login page should be displayed with input fields for email and password. 2. email should be entered without any formatting errors 3 password should be entered securely without being visible to others. 4.Dashboard should load, indicating a successful login 5. The administrator's name or username should be visibly	1. page is displayed with input fields for email and password. 2. administrator's email is entered correctly. 3.password is entered without being visible to others. 4. system redirects the dashboard page correctly. 5.Actual username is displayed on the top of the dashboard.	Pass	1. Input Validations are working correctly. 2. Alert messages are displayed successfully. 3 Pending to Resolved status changing working correctly. 4. Database updates with given inputs.

		displayed, confirming the user's identity.			5.Successfully retrieved data from the database.
Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_0 51.b	Username : Rahultt Password: rahul123	1 Password or Email incorrect message	1 displayed "Failed to Loging" message	Fail	Incorrect login credential checking logic working correctly.

Table 8.12 Administrator- Handling user inquiries test case

Project ID: ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Administrator- Handling user inquiries	
Test case ID: Test_052	Test case designed and executed by: Reg. No Name – Rahul N.W.P.G.T.T
Test Priority (High/Medium/Low):	High
Test Description: This test case verifies the process of handling user inquiries by the Administrator in the AgroNest Fertilizer Management System	
Preconditions: Administrator should have access to the system. At least one inquiry should be received and listed under the Pending tab.	
Test Steps: <ol style="list-style-type: none"> 1. Log in to the AgroNest Fertilizer Management System as the Administrator. 2. Navigate to the Inquiries section. 3. Verify that the pending inquiries are listed under the Pending tab. 4. Select a pending inquiry by clicking "View" button. 5. Solve the inquiry by providing necessary assistance or information. 6. Click on the "Send" button. 7. Verify that the inquiry is moved from the "Pending" tab to the "Resolved" tab. 8. Check if the resolved inquiry is no longer visible under the "Pending" tab. 9. Verify that the resolved inquiry is listed under the "Resolved" tab. 	

- Pass-conditions:** After sending reply to the received inquiries the system should not display received inquiries under the “Pending” tab.

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass/Fail)	Comment
Test_052	Recommend increasing nitrogen content in the fertilizer mix and adjusting application frequency. Suggest conducting a soil test for nutrient deficiency analysis for better accuracy.	1. Reply send successfully to the farmer . 2. Change its status “Pending ”to “Resolved” 3 Show solved inquiry in “Resolved” tab 4.Reply send to user dashboard successfully. 5. Show user inquiry when clicking “View”	1.Display error message when user send reply without entering any text . 2.Display “Reply sent successfully” message in left corner of page. 3.Changing its status and user can view it on Resolved tab. 4. Clearly shown user send inquiry in respond page.	Pass	1.Logging backend validation working successfully. 2. Verify that the login page is accessible and email validation and password validation is working correctly. 3 Confirm that after a successful login page will redirect to the admin dashboard. 4. confirm that the user can navigate through the system and is able to use all the features in the system within his/her role.

Feedback and Inquiry Management

Table 8.13 Submit feedback and inquiry through the platform test case

Project ID: : ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Submit feedback and inquiry through the platform	
Test ID: Test_002	Test case designed and executed by: Name – Veenath G.D. T.
Test Priority	Medium
Test Description: Submit feedback and inquiry through the platform.	
Pre-Conditions: User must be logged in as a registered farmer or dealer	
Test Steps: <ol style="list-style-type: none"> 1. Login to the system as a farmer or dealer. 2. Navigate to the Feedback and Inquiry section. 3. Select the appropriate option: Provide Feedback or Ask a Question. 4. Fill in the form with relevant details. 5. Click "Submit". 	
Pass-Conditions: Feedback or inquiry successfully submitted through the platform	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass / Fail)	Comment

Test_002 a	Feedback: Rating: 4 stars, Comment: "Great service!"	Confirmation message: "Feedback submitted successfully."	Confirmation message: "Feedback submitted successfully."	Pass	Feedback successfully submitted without errors
Test_002 b	Inquiry: Category: Technical Support, Question: "How to reset password?"	Confirmation message: "Inquiry submitted successfully. Admin response will be provided shortly."	Confirmation message: "Inquiry submitted successfully. Admin response will be provided shortly."	Pass	Inquiry successfully submitted without errors.
Test_002 c	Feedback: Rating: 5 stars, Comment: "Excellent experience!"	Confirmation message: "Feedback submitted successfully."	Error message: "Failed to submit feedback. Please try again."	Fail	Feedback submission failed due to unknown error

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Order Management

Table 8.14 Placing orders test case

Project ID: : ITP24_B4_W04	
Project Name: AgroNest – Fertilizer Management System	
Testing Function: Placing orders	
Test ID: Test_003	Test case designed and executed by: Name – semasingha W A L D.
Test Priority	High
Test Description: Registered farmer place orders in the system	
Pre-Conditions: Farmer should go to the fertilizer buying page	
<p>Test Steps:</p> <p>Step 1: Navigate fertilizer buying page. Step 2: Enter the quantity Step 3: Click pay Step 4: Click yes Step 5: Enter payment card 16 numbers Step 6: Enter expiration date Step 7: Enter cvv Step 8: Click pay</p>	
Pass-Conditions: New order placed successfully	

Test ID	Test Inputs	Expected Outputs	Actual Output	Result (Pass / Fail)	Comment

Test_003 a	<p>1. Order placing with valid information: Quantity: 3 Price: 400 Payment infor: 24374895647389374 Expiration date: 06/21 Cvv: 433</p> <p>2. Click “Buy Now” button</p>	Successfully placed order	A order successful placement	Pass	Successfully registered the order without errors
Test_003 b	<p>1. Order placing with valid information: Quantity: 4 Price: 6778 Payment infor: 54637898736282 Expiration date: 06/23 Cvv: 322</p> <p>2. Click “Buy Now” button</p>	Order placing failed	Pay now button hidden	Fail	Cannot place order
Test_003 c	<p>1. Order placing with valid information: Quantity: 6 Price: 5654 Payment infor: 64567834567834256 Expiration date: 0807 Cvv: 343</p> <p>2. Click “Buy Now” button</p>	Successfully placed order	A order successful placement	Pass	Successfully registered the order without errors

CHAPTER - 5

EVALUATION AND CONCLUSION

In the evaluation of our AgroNest Fertilizer Management System, we undertook an in-depth analysis of various metrics, user interactions, and system performance to derive comprehensive insights into its efficacy and impact. Through meticulous examination of user feedback, we discerned a profound appreciation for the system's intuitive interface, robust features, and seamless functionality. Farmers, dealers, and administrators alike lauded the platform for its user-friendly design, which facilitated effortless navigation and streamlined their interactions with the system. Notably, the feedback and inquiry management feature garnered praise for empowering users to provide valuable insights and address concerns, fostering a culture of accountability and continuous improvement within the agricultural ecosystem.

Furthermore, our data analysis revealed tangible improvements in fertilizer distribution efficiency, with farmers reporting reduced lead times and enhanced access to a diverse range of fertilizers. The order management module emerged as a cornerstone of the system, enabling farmers to effortlessly place orders, track deliveries, and manage payments through a centralized platform. By leveraging real-time data and analytics, administrators gained invaluable insights into user behavior, market trends, and performance metrics, empowering them to make data-driven decisions and optimize system operations.

A key highlight of our evaluation was the significant impact of the soil quality management feature on agricultural practices. Through partnerships with accredited laboratories, our system facilitated comprehensive soil testing services, empowering farmers to make informed decisions about fertilizer usage and soil health management. The personalized recommendations provided based on soil analysis reports were instrumental in guiding farmers towards sustainable farming practices and maximizing crop yields.

In conclusion, our evaluation underscores the transformative potential of the AgroNest Fertilizer Management System in revolutionizing fertilizer distribution, enhancing communication, and empowering stakeholders across the agricultural value chain. By leveraging technology to address critical challenges in agricultural management, our system has paved the way for sustainable growth, increased productivity, and improved livelihoods for farmers. Looking ahead, we remain committed to further enhancing the system's capabilities and expanding its reach to positively impact agricultural communities worldwide.

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APPENDICES

Individual Contribution

Table 12.1 Individual Contribution

	Student ID and Name	Tasks
01	Veenath G.D.T.	<p>Function: Feedback and Inquiry Management</p> <ul style="list-style-type: none">Created,<ol style="list-style-type: none">Use case diagramUse case scenarioSequence diagramActivity diagramfor feedback and inquiry management.Created test cases for feedback and inquiry management. (Test_031, Test_032)Included screenshots of user interfaces of the relevant function.Completed the introduction part and onion diagram, system overview diagram and high-level architectural diagram of the proposal report.
02	Semasingha W. A. L. D.	<p>Function: Order Management</p> <ul style="list-style-type: none">Created,<ol style="list-style-type: none">Use case diagramUse case scenarioSequence diagramActivity diagramfor order management function.Created test cases for order management. (Test_031, Test_032)Included screenshots of user interfaces of the relevant function.Completed methodology part of the project report

03	Thisaravi R.D.H	<p>Function: Soil Quality Management.</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for soil quality management function. • Created test cases for the soil quality management. (Test_031, Test_032) • Included screenshots of user interfaces of the relevant function. • Completed aims and objectives part of the proposal report.
04	Mihindukulasuriya O.S	<p>Function: Laboratory Management.</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for laboratory management function. • Created test cases for the laboratory management. (Test_041, Test_042, Test_043) • Included screenshots of user interfaces of the relevant function. • Completed the problem and the motivation sections of the proposal report.
05	Rahul N.W.P.G.T.T.	<p>Function: Manage Admin Dashboard</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for managing admin dashboard. • Created test cases for the admin dashboard management. (Test_031, Test_032) • Included screenshots of user interfaces of the relevant function. • Completed the tools and technologies part of the proposal report.

06	Kandage T.P.	<p>Function: System Data Analysis.</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for system data analysis function. • Created test cases for the system data analysis. (Test_061, Test_062) • Included screenshots of user interfaces of the relevant function. • Completed the stakeholders and requirements analysis part of the proposal report.
07	Dayarathna W.S.R.	<p>Function: Fertilizer Inventory Management.</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for fertilizer inventory management function. • Created test cases for fertilizer inventory management. (Test_001, Test_002) • Included screenshots of user interfaces of the relevant function. • Completed the literature review and solution overview part of the proposal report.
08	Perera G.D.G.N.	<p>Function: Article and Promotion Management.</p> <ul style="list-style-type: none"> • Created, <ol style="list-style-type: none"> 1. Use case diagram 2. Use case scenario 3. Sequence diagram 4. Activity diagram for article and promotion management function. • Created test cases for the article and promotion management. (Test_032, Test_033) • Included screenshots of user interfaces of the relevant function. • Completed the abstract and acknowledgement part of the proposal report.

Gratitude and Appreciation

Thank you for your support and collaboration throughout this project. Your dedication has been invaluable, and we look forward to continuing our journey together.



-Thank You-