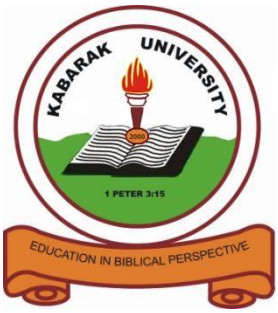

KABARAK UNIVERSITY

SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY.

PROJECT: AGRICULTURAL TECHNOLOGY E-COMMERCE.

PROJECT TITLE: AGRITECH ONLINE SHOP.

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A Project Report Documentation Submitted in The Department of Computer Science and IT in Partial fulfillment of the

Degree of Information Technology.

Submitted On

…….....

DECLARATION

Declaration by the candidate

We hereby declare that the proposal AGRITECH ONLINE SHOP SYSTEM submitted to the School of Science, Engineering and Technology: Kabarak University for partial fulfillment of the requirement for the award of Bachelor of Science in Information Technology is a result of original work carried out by our group (with members being):

Name: ELVIS KIPRONO. Sign……. Date…….

JACOB MUTISO. Sign……. Date…….

ANASTACIA KIMAIYO Sign……. Date…….

REBECCA NAFULA. Sign……. Date…….

Supervisor: This project has been submitted with my approval as University Supervisor.

Sign: ……. Date: …….

Mr. Andrew Kipkebut

ACKNOWLEDGEMENT.

We would like to express our heartfelt appreciation to all those who have contributed to the making of this proposal. Our sincere gratitude goes out to every individual who has supported us in various ways.

We are extremely grateful to the School of Science, Engineering and Technology, for their invaluable guidance and unwavering supervision throughout the proposal writing process. Their timely advice, helpful feedback and provision of vital information were instrumental in the completion of this proposal.

In addition, we would like to extend our sincere thanks to our colleagues and members of the Kabarak Community for their kind co-operation and constant encouragement. Their support and motivation were essential in helping us accomplish this task.

Once again, we express our deepest gratitude to everyone who has played a role in making this proposal a reality.

DEDICATION

This project is dedicated to the field of Agriculture and Food Security.

ABSTRACT

Our innovative Agritech Shop Project aims to revolutionize the agricultural industry by providing a cutting-edge online platform for farmers to easily purchase and sell agriculture products. Our user-friendly website is designed to enable farmers to conveniently access a wide range of products including high-quality seeds, pesticides, and fertilizers from anywhere, regardless of geographic location. This online store seeks to bridge the gap between farmers in remote areas and access to essential agricultural products by providing a seamless online shopping experience. The use of internet connectivity allows customers and business owners to communicate effectively, share resources, and access a diverse range of information, thereby improving productivity and yields in the agricultural sector.

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LIST OF ACRONYMNS

IT - information technology

DBMS - database management system

WAMP (Windows, Apache, MySQL, and PHP)

PHP - Hypertext Preprocessor

CHAPTER ONE

1.0 INTRODUCTION

1.1 Introduction

As the world progresses towards digitalization, online shopping has become a norm for buying and selling products. However, in the agricultural sector, customers often have to physically visit farmers to purchase plants, seeds, fertilizers, and pots, and farmers have limited opportunities to sell their produce beyond their local market. The lack of proper information regarding purchases and agriculture guidance is also a major issue. Therefore, to cater to the needs of the farming community, we have developed an innovative web application, the "Online Agritech Shop."

The aim of our project is to provide a comprehensive platform for customers to purchase agriculture products and for farmers to sell their produce online. The Online Agritech Shop provides all necessary information related to plant growth, including the type of fertilizers required and the amount of water needed. Our application bridges the gap between farmers, customers, and dealers by providing direct communication channels that facilitate transparent transactions, fair pricing, and a greater profitability for farmers.

Our application also provides unique interfaces for farmers, customers, and administrators, with features such as marketing tools, online payment options, and commodity-wise reports to help farmers understand the market trends and make informed decisions. With our interactive and user-friendly platform, farmers can reach a wider audience and sell their products at better prices, while customers can access a diverse range of agriculture products with ease.

1.2 Background of the study

Agriculture is a vital sector for economic growth and development in many countries, providing essential resources such as food, income, and employment. In recent years, the application of digital technologies in agriculture has rapidly increased, leading to the emergence of Agritech online shops. These online platforms offer a wide range of products and services, such as seeds, fertilizers, machinery, and guidance on crop management, to farmers and agribusinesses.

The advent of Agritech online shops has the potential to revolutionize the way agricultural products are bought and sold, particularly in developing countries where traditional markets are often fragmented and inefficient. By providing a centralized platform for farmers to purchase agricultural inputs and sell their produce, Agritech online shops can improve market efficiency, reduce transaction costs, and ultimately increase farmers' profitability.

However, the adoption of e-commerce in agriculture is not without challenges. Limited access to digital infrastructure, low levels of digital literacy among farmers, and concerns about data privacy and security are significant issues that need to be addressed. To fully realize the potential of Agritech online shops, there is a need for collaboration among stakeholders, including policymakers, digital infrastructure providers, and farmers' organizations, to develop innovative solutions that address these challenges.

Our project, the Online Agritech Shop, aims to provide a user-friendly platform for farmers to buy and sell agriculture products online, bridging the gap between farmers, customers, and dealers. Through our innovative platform, we seek to promote sustainable agriculture practices, support the growth of the agricultural sector, and create a more efficient and transparent marketplace for all stakeholders

1.2.1 Current system

The existing system lacks a comprehensive and integrated solution that addresses the specific needs and challenges of small-scale farmers, especially those in remote and rural areas. There is a need for a dedicated Agritech online shop that can bridge the gap between supply and demand, provide relevant and reliable information and support, and promote sustainable agriculture and rural development.

1.3 Problem statement

Small-scale farmers face difficulties in accessing agricultural inputs, technologies, and markets due to lack of information and infrastructure, which leads to lower yields, income, and food security. Traditional offline stores are often inaccessible, expensive and lack variety, while online platforms are tailored to their specific need s and lack trust, support, and education. Additionally, supply chains are fragmented, inefficient, and unsustainable, causing waste, loss and environmental damage

Therefore, there is need for a reliable and user -friendly Agritech online shop that offers a wide range of affordable and high quality products and services, such as seeds, fertilizers, tools, equipment, advisory, and market linkage. The online shop should provide relevant and accurate information, training, and customer support in local languages, and ensure timely and safe delivery to remote and rural areas. It should also integrate with other stakeholders such as government agencies, NGOs, and private companies to enhance collaboration innovation and impact in the agricultural sector. By doing so the Agritech online Shop can empower small-scale farmers to improve their productivity, and resilience, and contribute to the sustainable development of agriculture and rural areas.

1.4 **Purpose of the study**

1.5 Main objective

The main objective of the Agritech Online Shop system is focused on improving accessibility, efficiency, transparency and collaboration in the agricultural sector.

1.5.1 Specific objectives

i. To increase accessibility of agricultural products.
ii. To facilitate online transactions.
iii. To improve market efficiency.
iv. To promote entrepreneurship and rural development.

1.5.2 Research questions

1. What are the main factors that influence customer adoption of an agritech online shop?
2. What are the most important factors that customers consider when choosing to buy products from an agritech online shop?
3. How do customers perceive the convenience and accessibility of an agritech online shop compared to traditional brick-and-mortar stores?
4. What are the main challenges faced by an agritech online shop in terms of logistics and supply chain management?
5. How can an agritech online shop ensure timely delivery of fresh and perishable products to customers?
6. What are the most effective marketing strategies for an agritech online shop to attract and retain customers?
7. How can an agritech online shop effectively manage customer complaints and ensure customer satisfaction?

1.6 The proposed system

Introducing the revolutionary Agritech Online Shop – a cutting-edge digital platform designed to revolutionize the way farmers market their produce and access agricultural products and services. Our platform is designed to offer a hassle-free and seamless experience, allowing farmers to buy and sell their products with ease, while accessing all the services they need to grow and thrive. With our state-of-the-art system, farmers can say goodbye to the old, outdated methods of trading and embrace the future of agriculture with confidence. So why wait? Join the Agritech Online Shop today and unlock a world of possibilities for your farm and agricultural business.

1.6.1 System modules.

- ✓ User.
- ✓ Administrators
- ✓ Payment Gateway
- ✓ Shipping and Logistics providers
- ✓ Support and Customer services
- ✓ Reviews and rating system
- ✓ Product database

Brief description on the modules:

User: They are the main stakeholders in the project as they are the ones who will be using the platform to browse, purchase and track agricultural products and equipment.

Administrators: They are responsible for managing the platform, ensuring its smooth operation, and resolving any issues that may arise.

Payment Gateway: Is a third party service that processes payment transaction between buyers and sellers.

Shipping and Logistics providers: They are responsible for the safe and timely delivery of products to buyers.

Support and Customer Services: They are responsible for assisting users with any issues or queries they may have.

Review and Rating system: It allows buyers to rate and review products and sellers on the platform.

Product Database: It is a repository of all the agricultural products and equipment listed on the platform**.**

1.7 Justification for the study/ significance.

The study of agritech online shops is significant because it has the potential to transform the agricultural sector and improve the livelihood of farmers and other stakeholders. The adoption and use of online shops can provide farmers with access to new markets, increase their

competitiveness, and improve their income. It can also promote sustainable agriculture practices, support local economic development, and reduce carbon emissions from transportation. However, the impact of e-commerce on the agricultural sector and local communities is not without challenges, such as the digital divide and the concentration of power in the hands of large e-commerce platforms. Therefore, understanding the benefits and challenges of agritech online shops and the factors that influence their adoption and usage is crucial for policymakers, farmers, and other stakeholders. The findings of this study can inform the development of policies and strategies to promote the adoption and use of agritech online shops and support sustainable agriculture practices.

1.7.1 The feasibility study

1.7.2 Technical Feasibility

The technical feasibility requires that the following skills are required for the proposed system. One has to have knowledge in coding in HTML, PHP, CSS, AJAX and JavaScript in the development of the web based system.

1.7.3 Economic Feasibility

At the heart of every successful project lies economic feasibility, and the proposed system is no exception. We have conducted extensive research and analysis to determine the financial viability of our platform, and the results speak for themselves. By investing in our system, farmers and agricultural businesses can expect to see a significant increase in their productivity, profitability, and overall efficiency. While some initial funds are required to ensure the smooth functioning of the system, the long-term benefits far outweigh the short-term costs. With our cutting-edge technology and innovative approach to agriculture, the Agritech Online Shop is poised to revolutionize the industry and unlock new levels of success for farmers around the world. So why not join us on this journey towards a brighter future for agriculture? The economic feasibility of our platform is just the beginning – the possibilities are endless.

1.7.4 Operational Feasibility

This analysis involves how it will work when it is deployed and the assessment of the environment in which it is implemented. People are usually resistant to change and a web based system is a major twist or transformation when it comes to solving challenges that the people face, but in this instance we have faith that the proposed web based system is efficient, convenient, simple and flexible for the users who are going to access these automated services and activities of the Agritech Online Shop and thus many users will probably accept the system because of the features and functionalities that it has, since it will increase their rescue rate.

1.7.5 Physical Feasibility

It involves study to establish the time responses of the new system being created. For example, how long will take a user to be able to send their alerts. It should be clearly establishing that the new system requirements where its accuracy would be precise.

1.8 The scope and limitation of the project.

The scope of an agritech online shop project will depend on the specific goals and objectives of the project, as well as the resources available to the team. However, some general areas of scope include:

a. Development of a user-friendly platform.
b. Creation of a comprehensive product catalogue.
c. Implementation of a marketing and promotion strategy.
d. Integration with third party services.

However, there are also limitations to consider in an agritech online shop project, including:

a. Connectivity issues.

b. Logistics and delivery.

c. Language barriers.

d. Dependence on sellers.

CHAPTER TWO:

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the literature review carried out during coming up with this system. Agritech online shops are digital solutions that have emerged in recent years. These online shops provide a platform for farmers and other stakeholders in the agricultural sector to buy and sell agricultural products, machinery and equipment. Despite the growth in the agritech sector, there is limited literature available on agritech online shop. This literature review aims to fill this gap by critically analyzing the existing literature on agritech online shops. Specifically, the review will focus on the benefits and challenges of agritech online shops, their impact on the agricultural sector and the factors that influence their adoption and usage.

The review will draw on a range of academic and none academic sources, including peer reviewed articles, books and reports. By analyzing the existing literature, the review will provide valuable insights into the potential of agritech online shops to transform the agricultural sector and improve the livelihood of farmers and other stakeholders.

2.2 General overview of the literature related to the main concepts

A study by Kiptot et al. (2019) found that e-commerce platforms could improve market access and increase profitability for small-scale farmers in Kenya. Meanwhile, a review by Qiao et al. (2018) highlighted the potential of blockchain technology in enhancing transparency and traceability in agricultural supply chains. However, some studies have also identified barriers to the adoption of online shops, such as limited internet connectivity and low digital literacy among farmers (e.g., Atsbha et al., 2020).

References:

Atsbha, T., Belay, K., & Ghebremeskel, T. (2020). The impact of digital platforms on smallholder farmer is marketing access: A review of the literature. Journal of Agribusiness in Developing and Emerging Economies, 10(2), 154-170.

Kiptot, E., Hebinck, P., & Franzel, S. (2019). E-commerce and smallholder farmers in Africa: Opportunities, challenges, and scalability. Development in Practice, 29(6), 711-722.

Qiao, Y., Xie, X., Li, M., & Wang, Y. (2018). Blockchain technology in agriculture: A systematic literature review. Computers and Electronics in Agriculture, 154, 214-227.

Chapter 2.3 Literature review based on objective one.

The concept of corporate social responsibility (CSR) is particularly relevant to the agritech industry, as it involves issues related to food security, sustainability, and social and environmental impact. An agritech online shop can adopt CSR practices to promote sustainable farming practices, support local communities, and reduce its carbon footprint.

One way our agritech online shop can promote CSR is by sourcing its products from local farmers and supporting small-scale agriculture. This can help to promote local economic development, reduce carbon emissions from transportation, and ensure the quality and safety of the products. This online shop can also provide information and education to its customers on the benefits of buying locally produced food and supporting sustainable agriculture practices.

Another important aspect of CSR for our agritech online shop is environmental sustainability. The online shop can reduce its carbon footprint by using eco-friendly packaging materials, optimizing its supply chain to reduce transportation emissions, and implementing energy-efficient practices in its operations. By promoting sustainability, the online shop can help to mitigate the impact of climate change and preserve natural resources for future generations.

Finally, our agritech online shop can also support social causes, such as education, healthcare, and poverty alleviation. The online shop can donate a portion of its profits to charitable organizations or support local initiatives that promote social development. By promoting social causes, the online shop can help to address the social and economic challenges facing local communities.

Reference:

González-Tirados, R. M., Díaz-Fernández, M. C., & Martín-Sánchez, V. (2021). Corporate social responsibility in the agrifood sector: A systematic review of the literature. Sustainability, 13(8), 4564. Doi: 10.3390/su13084564

Chapter 2.4 Literature review based on objective two.

E-commerce has revolutionized the way businesses operate, and the agricultural sector is no exception. Our agritech online shop can provide farmers with access to new markets, improve their competitiveness, and increase their income; the platforms can also help to connect farmers with buyers, streamline the supply chain, and reduce transaction costs.

An agritech online shop can also have a positive impact on local communities. By sourcing its products from local farmers, the online shop can promote local economic development and support small-scale agriculture. The online shop can also provide information and education to its customers on the benefits of buying locally produced food and supporting sustainable agriculture practices.

However, the impact of e-commerce on the agricultural sector and local communities is not without challenges. For example, the digital divide may prevent some farmers from accessing e-commerce platforms, and the lack of infrastructure and logistical support may limit the reach of online sales. In addition, the dominance of large ecommerce platforms may lead to a concentration of power and reduce the bargaining power of small farmers.

Despite these challenges, the potential benefits of an agritech online shop for the agricultural sector and local communities are significant. An online platform can help to promote sustainable agriculture practices, support local economic development, and improve the livelihoods of small farmers.

Reference:

Izquierdo-Yusta, A., Velasco-Muñoz, J. F., & Sarabia-Sánchez, F. J. (2018). E-commerce and the competitiveness of smallholder farmers in developing countries. Journal of Cleaner Production, 200, 357-366. doi:10.1016/j.jclepro.2018.07.062

Chapter 2.5 Literature review based on objective three.

Akhtaruzzaman, M., Karim, M. R., & Rashid, M. H. (2021). Role of e-commerce in agricultural development in Bangladesh: a study on the perception of farmers. Journal of Asian and African Social Science and Humanities, 7(1), 83-95.

Bhatnagar, A., & Singh, H. (2018). E-commerce and its impact on agriculture in India. Journal of Agribusiness in Developing and Emerging Economies, 8(1), 60-75

CHAPTER 2.6 LITERATURE REVIEW BASED ON OBJECTIVE FOUR.

One study by Guo et al. (2020) examined the factors influencing the adoption of e-commerce among farmers in China. The study found that farmers who were more educated, younger, and had higher incomes were more likely to adopt e-commerce for purchasing agricultural inputs.

Another study by Nizamuddin et al. (2021) investigated the impact of e-commerce on the purchasing behavior of farmers in Pakistan. The study found that e-commerce platforms had a positive impact on the purchasing behavior of farmers, as it allowed them to access a wider range of products at competitive prices.

Similarly, a study by Buzby et al. (2020) examined the impact of online platforms on the purchasing behavior of small-scale farmers in the United States. The study found that online platforms had a positive impact on farmers' purchasing behavior, as it allowed them to save time and access a wider range of products than traditional retail channels.

However, other studies have suggested that online platforms may not have a significant impact on farmers' purchasing behavior. For example, a study by Fayezi et al. (2019) examined the adoption of e-commerce among farmers in Iran and found that there was no significant relationship between e-commerce adoption and farmers' purchasing behavior.

Overall, the literature suggests that online platforms can have a positive impact on farmers' purchasing behavior, particularly for those who are more educated, younger, and have higher incomes. However, more research is needed to fully understand the impact of online platforms on farmers' purchasing behavior, particularly in different contexts and regions.

References:

Buzby, J. C., & Hyman, J. (2020). Online platforms and small-scale farmers in the United States: Opportunities and challenges. Journal of Agriculture, Food Systems, and Community Development, 9(1), 1-19.

Fayezi, S., Karami, E., & Arabzad, S. M. (2019). Determinants of farmers' adoption of e-commerce in Iran: A structural equation modeling approach. Agricultural Economics Review, 20(1), 73-84.

Guo, X., Jin, G. Z., & Yang, L. (2020). The adoption of e-commerce by farmers in China: The role of government policy. China Agricultural Economic Review, 12(4), 686-702.

Nizamuddin, M., Ali, S., Shah, S. M. A., & Shoaib, M. (2021). E-commerce and agriculture: An analysis of purchasing behavior of farmers in Pakistan. Cogent Business & Management, 8(1), 1881262.

2.6 Design Framework

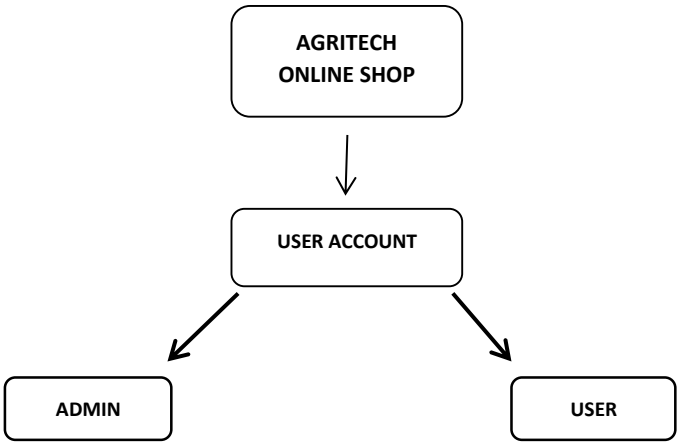


Figure 2.1: A concept map

2.7 Chapter Summary

This is a literature review chapter of an agritech online shop system, covering benefits and challenges, the impact on the agricultural sector, factors influencing adoption and usage, and two specific objectives. Objective one is the use of corporate social responsibility practices to promote sustainable farming practices, support local communities, and reduce carbon footprint. Objective two is to discuss the impact of e-commerce on the agricultural sector and local communities, including challenges such as the digital divide and infrastructure issues, and benefits such as promoting sustainable agriculture practices, supporting local economic development, and improving the livelihoods of small farmers. The literature cited includes studies on e-commerce, blockchain technology, and corporate social responsibility.

CHAPTER THREE:
3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 introduction

Research Design methods

- Structured online questionnaires
- Online Surveys

Location of the study

- Targeted online advertising on social media platforms
- Leveraging existing networks of agricultural organizations and cooperatives

Population of the Study

- All customers who have made a purchase on the Agritech online shop in the past 12 months
- Analyzing shopping behavior, purchase frequency, product preferences, and satisfaction levels

Sampling Procedure and Sample size Sampling Procedure

- Simple random sampling
- Sample size: using the formula for calculating the minimum sample size needed for a given population size and confidence level

Data Collection Procedure

- Surveys/questionnaires

System development methodology

- Agile methodology consisting of four steps:
    1. Define the product vision and scope
    2. Plan the development process
    3. Develop in sprints
    4. Review and adapt the process

3.2 Research Design methods.

We ended up using two methods to collect data all through secondary sources of data collection. They included:

- ✓ Structured online questionnaires.
- ✓ Online Surveys.

Structured online questionnaires

A structured questionnaire is a document that contains a series of standardized questions with a predetermined framework that sets the precise language and sequence of the questions, and is used to collect data from respondents. Questionnaires to be distributed to several farmers will reveal their thoughts in having an online shop to help them buy and market their farm produce.

Online Surveys

Conducting online surveys can be an effective way of collecting customer feedback and preferences. This can help the agritech online shop understand the needs of its customers and improve its offerings.

3.3 Location of the study.

To reach potential respondents in Kenya, we preferred targeted online advertising on social media platforms such as Facebook, Twitter, and LinkedIn. In addition, we leverage existing networks of agricultural organizations and cooperatives in Kenya to distribute the survey to their members.

Once the survey responses have been collected, the researcher could use statistical analysis to identify patterns and trends in the data and to develop insights into the needs and preferences of smallholder farmers in Kenya. The findings from the survey could then be used to guide the development of the agritech online shop, including product selection, pricing, and marketing strategies.

3.4 Population of the Study.

The population of the study is comprised of all customers who have made a purchase on the Agritech online shop in the past 12 months. This includes both individual consumers and businesses who have purchased agricultural products, such as seeds, fertilizers, pesticides, and farming equipment, through the online platform. The study aims to analyze the shopping behavior of this population, including factors such as purchase frequency, product preferences, and satisfaction levels with the online shopping experience. The results of the study will help the Agritech online shop to optimize its product offerings and improve customer satisfaction.

3.5 Sampling Procedure and Sample size Sampling Procedure:

A random sampling procedure will be used to select a representative sample from the population of the study. First, a list of all customers who made a purchase on the Agritech online shop in the past 12 months will be obtained. Then, a random selection of customers will be chosen from this list using a computer-generated algorithm to ensure that each customer has an equal chance of being selected for the study.

Sample Size: The sample size for the study will be determined using the formula for calculating the minimum sample size needed for a given population size and confidence level. Assuming a confidence level of 95% and a margin of error of 5%, the minimum sample size needed for a population of 250 customers is approximately 70. Therefore, a sample size of 120 customers will be selected to participate in the study to ensure that the sample size is adequate and representative of the population.

3.5.1 Sampling Procedure

Simple random sampling:

This is the most basic form of sampling, where each member of the population has an equal chance of being selected for the study. For example, if a researcher wanted to study the purchasing habits of online shoppers, they might use a random number generator to select a sample of customers from the entire population of online shoppers.

3.5.2 Sample Size.

To determine the sample size, the researcher can use the following formula:

$n = (Z^2 * \sigma^2) / E^2$

Where:

n = sample size Z = the Z-value for the desired confidence level (in this case, 1.96 for 95% confidence) σ = the standard deviation of the population (if unknown, a conservative estimate can be used) E = the desired margin of error (in this case, 0.05)

Assuming a standard deviation of 10 and using the formula, we get:

$n = (1.96^2 * 10^2) / 0.05^2$

$n = 384.16$

So, the appropriate sample size for this study would be 385 farmers. This sample size would provide a 95% confidence level with a margin of error of 5%, allowing the researcher to make valid inferences about the population of interest.

3.6 Data Collection Procedure

Surveys/questionnaires: This involves asking participants to respond to a set of questions related to the research question. Surveys can be administered through various methods such as online, mail, phone, or in-person. They can be either self-administered or administered by a trained interviewer.

3.7 System development methodology

Several SAD methodologies exist, the best one currently stands to be agile methodology and is the one we selected to develop our system.

To expound; Agile methodology is a flexible and iterative approach to software development that prioritizes customer satisfaction, continuous delivery of working software, and collaboration between developers and stakeholders.

Agile methodology consists of four steps:

1. **Define the product vision and scope**; this involves working with stakeholders to identify the features and functionalities that are most important for the Agritech online shop. The product vision and scope should be clearly defined and communicated to the development team.
2. **Plan the development process**; the development team plans the development process using a series of sprint. Sprints are short development cycles that typically lasts 2 to 4 weeks. The team prioritizes the features and functionalities to be developed in each sprint based on its importance and complexity.
3. **Develop in sprints**; the development team will work on developing the features and functionalities identified in the planning phase. At the end of each sprint, the team delivers a working version of the software.
4. **Review and adjust**; the development team reviews their progress and adjusts their plans for the next sprint based on the feedback received.

5. **Test and deploy;** the team thoroughly test the software to ensure it is working as intended. Once testing is complete, the software is deployed to the production environment and made available to the users.
6. **Continuous improvement**; after the software is deployed, the development team will continue to gather feedback from users and stakeholders and make improvement based on that feedback.

The key principle of the Agile process is a reduction in planning to focus on a highly iterative design and construction process, enabling teams to accomplish more in less time, without impacting client satisfaction. This is what was considered when choosing it for our project. The prototyping and rapid construction phases may be repeated until the product owner and users are satisfied that the prototype and build meets the project requirements.

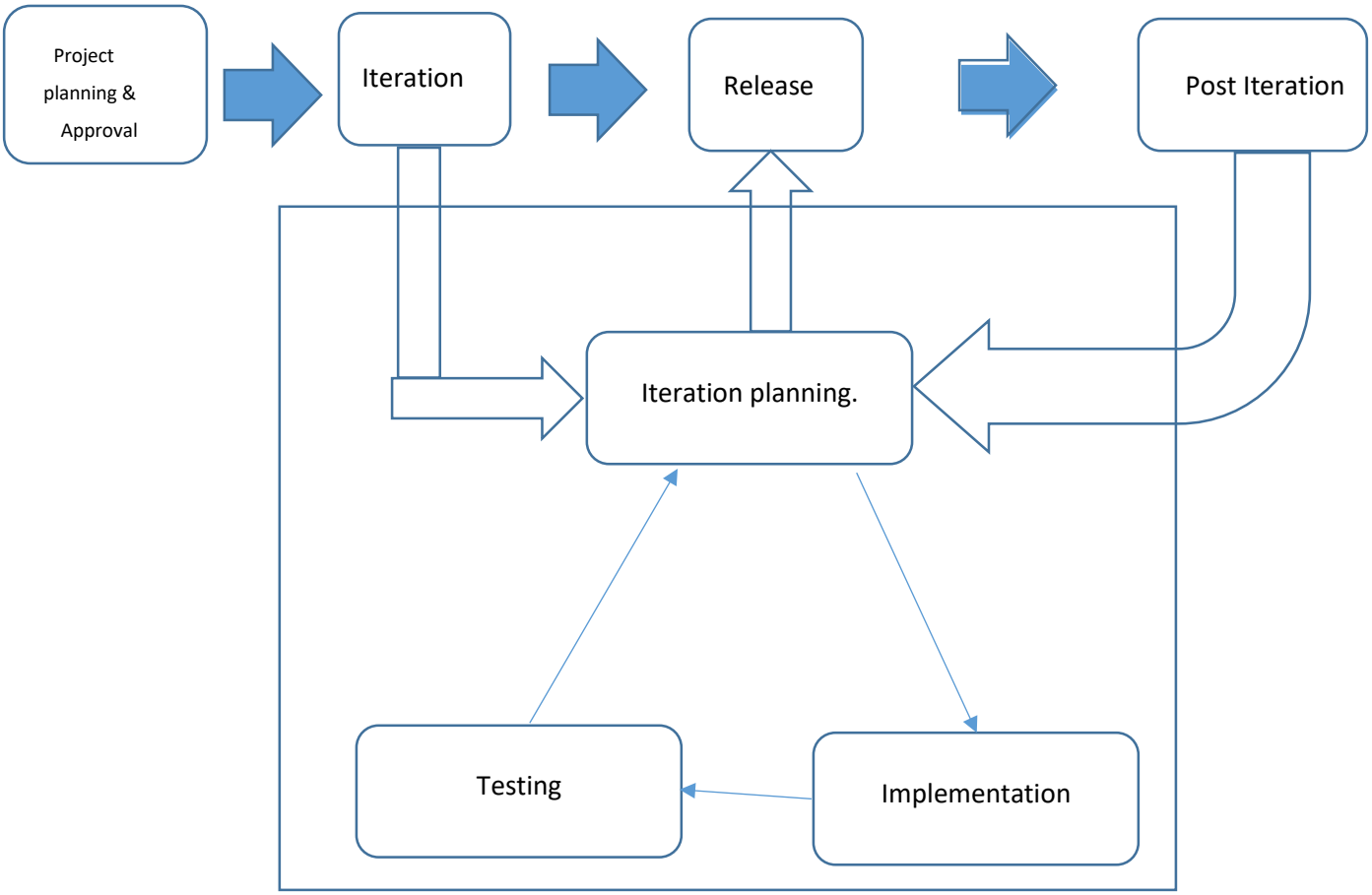

Project planning & Approval
Iteration
Release
Post Iteration
Iteration planning.
Testing
Implementation

Figure 2 Agile methodology

3.7.2 Programming methodology

JavaScript: JavaScript is a client-side scripting language that is commonly used for creating dynamic and interactive web pages. It can be used in conjunction with PHP to add functionality to the Agritech online shop, such as user interface enhancements, form validation, and client-side data processing.

HTML/CSS: HTML and CSS are markup languages used for creating the structure and styling of web pages, respectively. They are essential for creating the user interface and visual design of the Agritech online shop.

MySQL: MySQL is an open-source relational database management system that is commonly used with PHP to store and retrieve data for web applications. It can be used to store product information, customer data, and other important information for the Agritech online shop.

3.8 System analysis and design.

3.8.1 Context diagram Sample

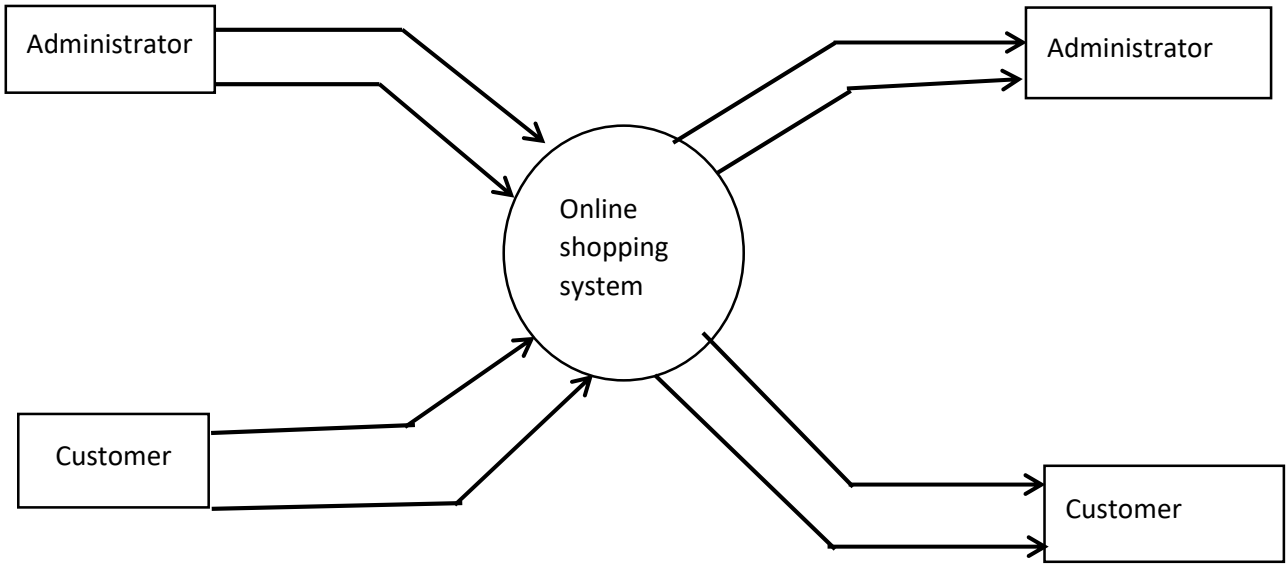


Figure 3 context diagram

3.8.2 DFD diagram

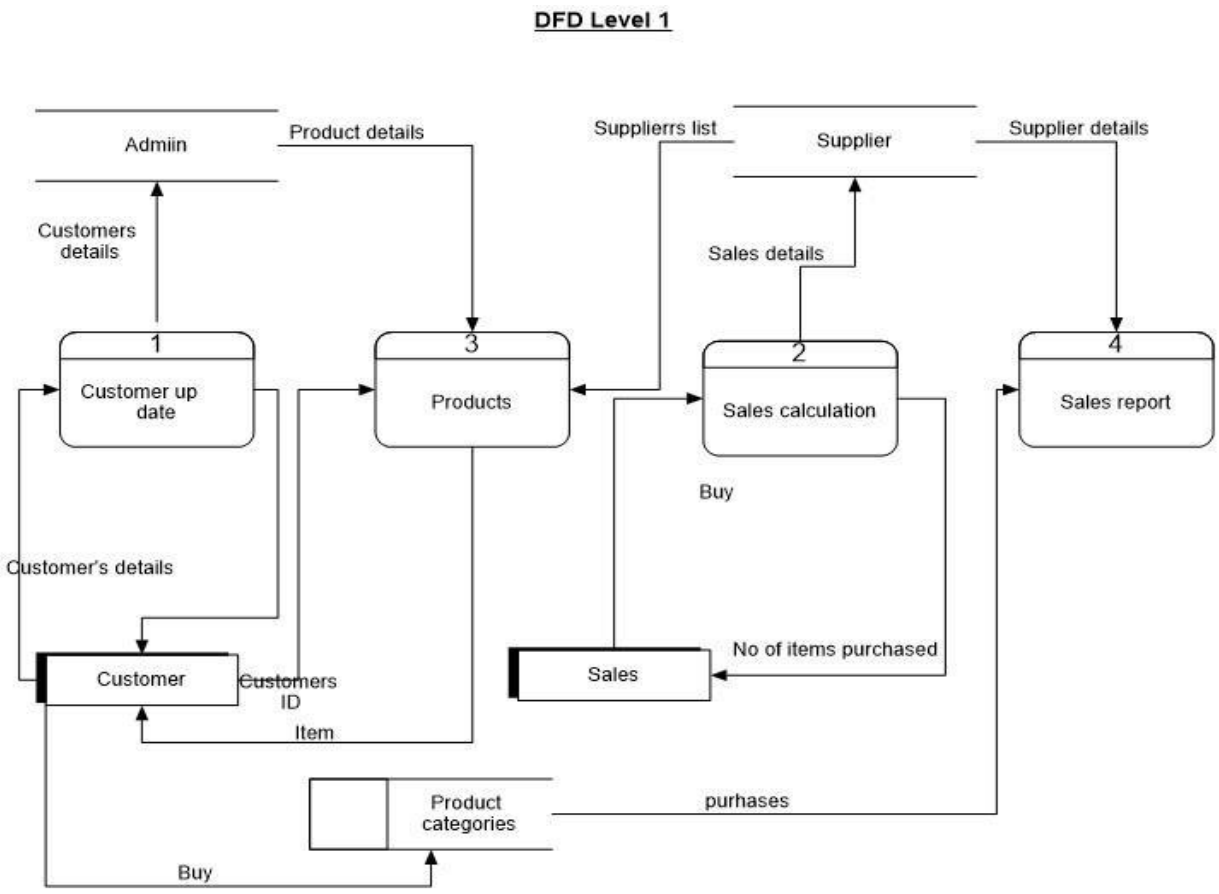
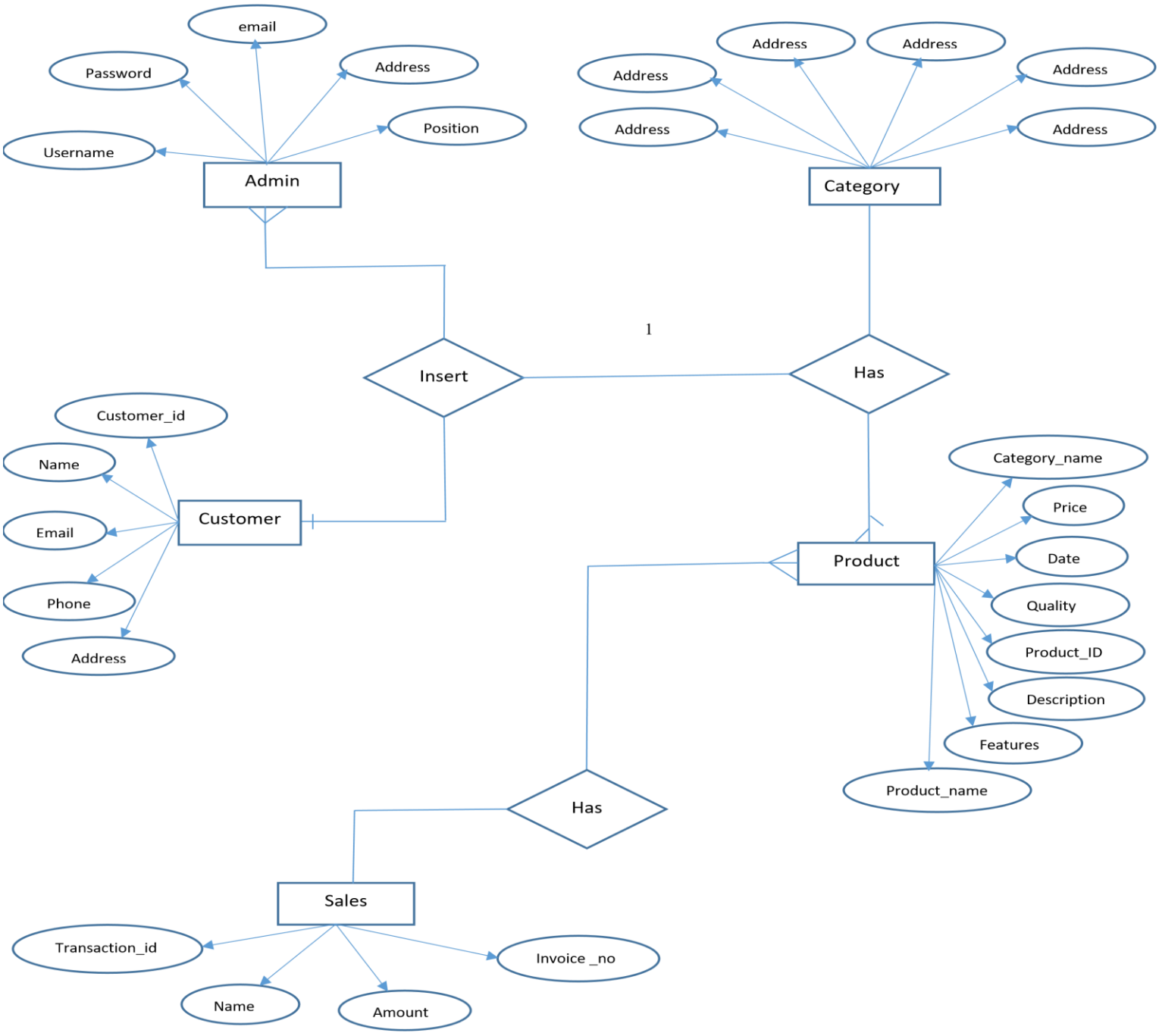
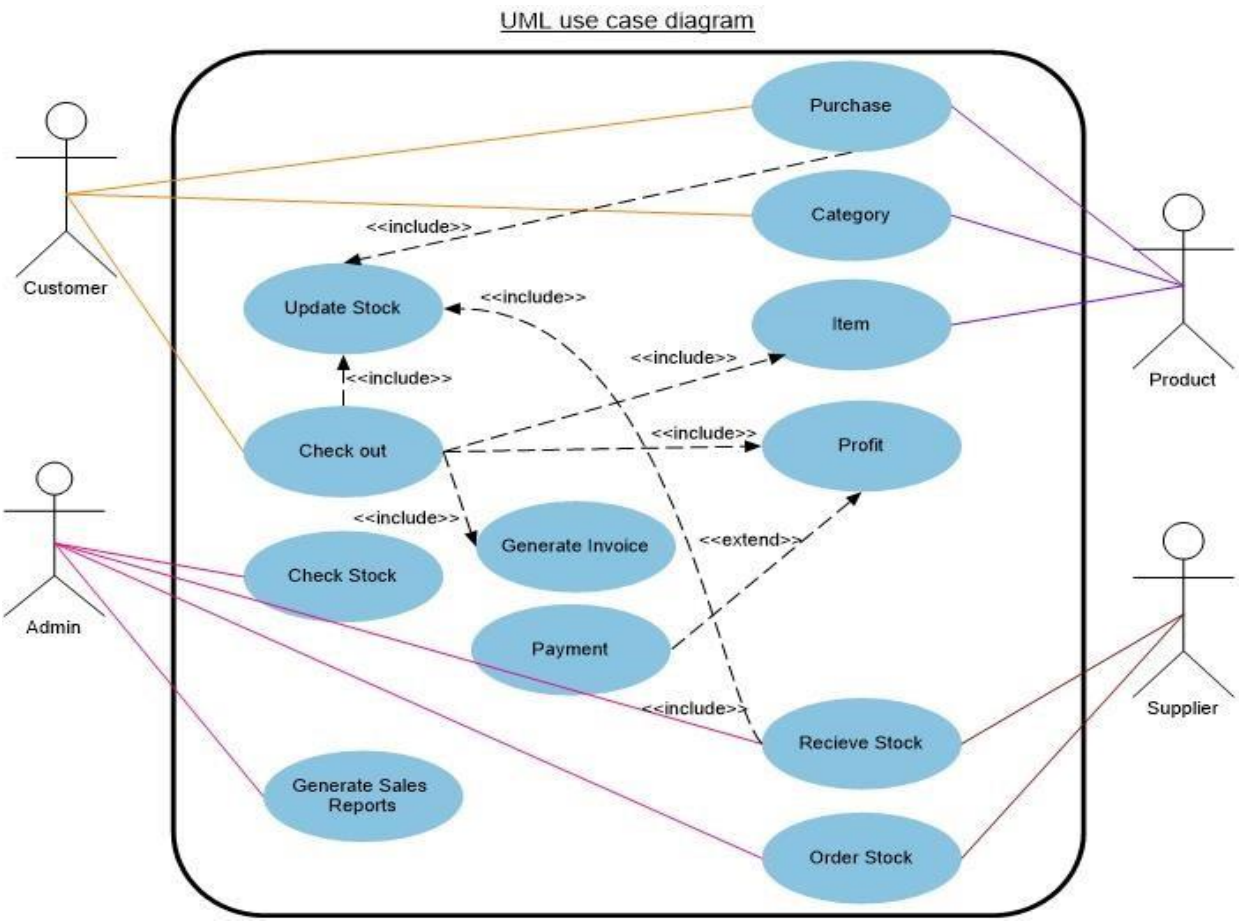


Figure 4 DFD diagram

3.8.3 E-R diagram

Figure 5 E-R diagram.





3.8.4 UML Use Case

Figure 6; Use-case Diagram for AgriTech Online Shop.

3.8.5 Proposed System testing techniques

1. Functionality Testing: This technique involves testing the system's functionality to ensure it meets the requirements and specifications of the agritech online shop. It includes testing the user interface, product search, ordering process, payment gateway, and shipping functionality.
2. Security Testing: This technique involves testing the system's security to ensure it is protected from unauthorized access, data breaches, and other security threats. It includes testing the authentication and authorization mechanisms, data encryption, firewalls, and vulnerability testing.
3. Performance Testing: This technique involves testing the system's performance to ensure it can handle the expected workload and user traffic. It includes testing the system's response time, scalability, and load balancing.
4. Usability Testing: This technique involves testing the system's usability to ensure it is user-friendly and easy to navigate. It includes testing the system's navigation, user interface, and user experience.
5. Compatibility Testing: This technique involves testing the system's compatibility with various devices, browsers, and operating systems. It includes testing the system's compatibility with different devices such as laptops, desktops, mobile phones, and tablets, and different browsers such as Chrome, Safari, Firefox, and Internet Explorer.
6. Regression Testing: This technique involves retesting the system after each change or modification to ensure that new changes do not affect the system's existing functionality.

3.8.7 Conclusion and Recommendation:

In conclusion, the development of an agritech online shop can provide significant benefits to small-scale farmers in Kenya. The online shop can provide farmers with access to a wider range of agricultural inputs, including crop protection products, at competitive prices. The online platform can also provide farmers with valuable information and resources to improve their farming practices, increase productivity, and enhance their profitability. However, the success of an agritech online shop depends on the quality of its design and implementation, as well as its ability to meet the needs and preferences of its target market.

Recommendation:

To ensure the success of an agritech online shop, it is recommended that the following measures be taken:

1. Conduct a thorough market research to understand the needs, preferences, and behavior of the target market.
2. Develop a user-friendly and responsive website and mobile application that provides a seamless and secure online shopping experience for farmers.

3. Provide quality products and services that meet the needs and preferences of farmers, including natural and organic crop protection products.
4. Offer competitive prices, discounts, and promotions to attract and retain customers.
5. Provide reliable and efficient delivery services that ensure timely and safe delivery of products to customers.
6. Ensure effective customer support services to handle inquiries, complaints, and feedback from customers.
7. Implement appropriate marketing strategies to increase brand awareness and attract new customers.
8. Regularly update and improve the online platform based on customer feedback and emerging trends in the agritech industry.

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Appendices

Research Instruments

I. Questionnaires for Farmers
II. Interview Guide for Agritech Online Shop Managers
III. Focus Group Discussion Guide for Farmers II) Work Plan
IV. Gantt chart of project tasks and timeline III) Budget
V. Itemized budget of project expenses IV) Maps and Graphics
VI. Map of the study area
VII. Flowchart of the Agritech Online Shop system
VIII. Sample screenshots of the Agritech Online Shop website and mobile app.

CHAPTER FOUR

4.0 SYSTEM DEVELOPMENT AND DEPLOYMENT

4.1 System description and Deployment

This part of the Agritech online shop project explains how the system is implemented and deployed, including its architecture, front end, user interface, modules, back end, and deployment methods.

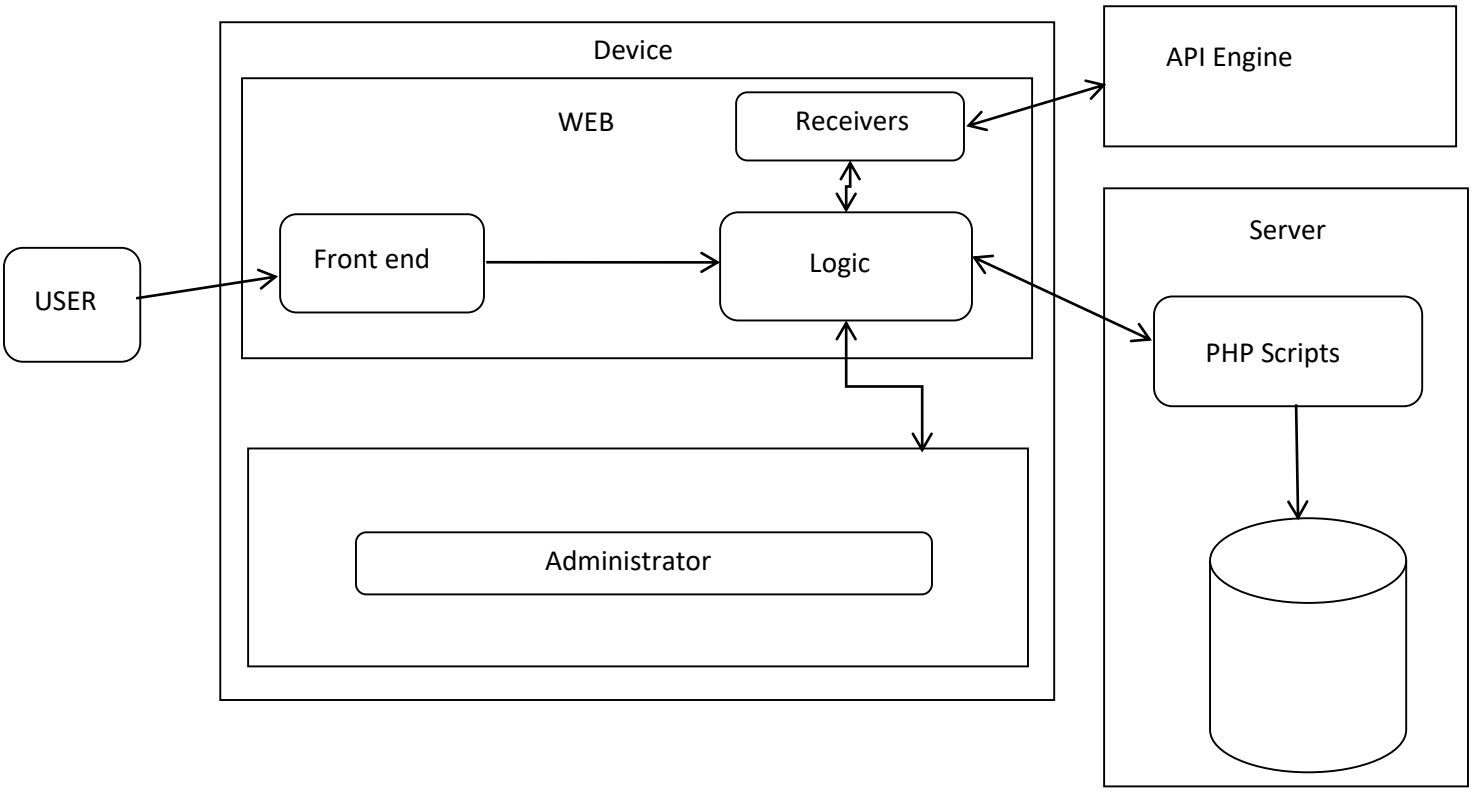

Figure 7 System description and Deployment

4.1.2 Front end development.

The front-end is build using html and css for styling. Javascript for decoration and adding functionalities.

An example is given below;

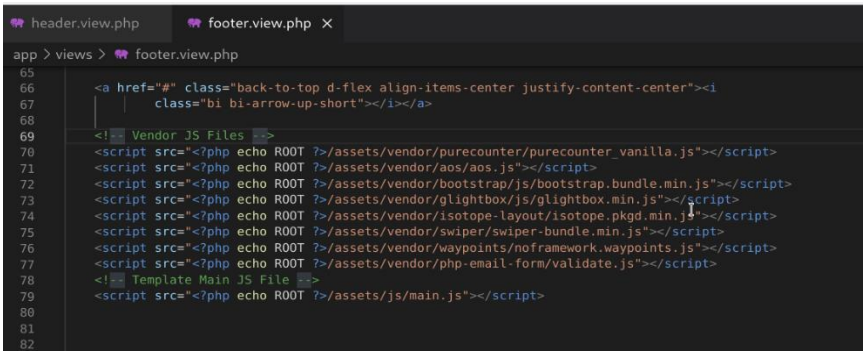

Figure 8 Front end code

4.1.3 User interface Design

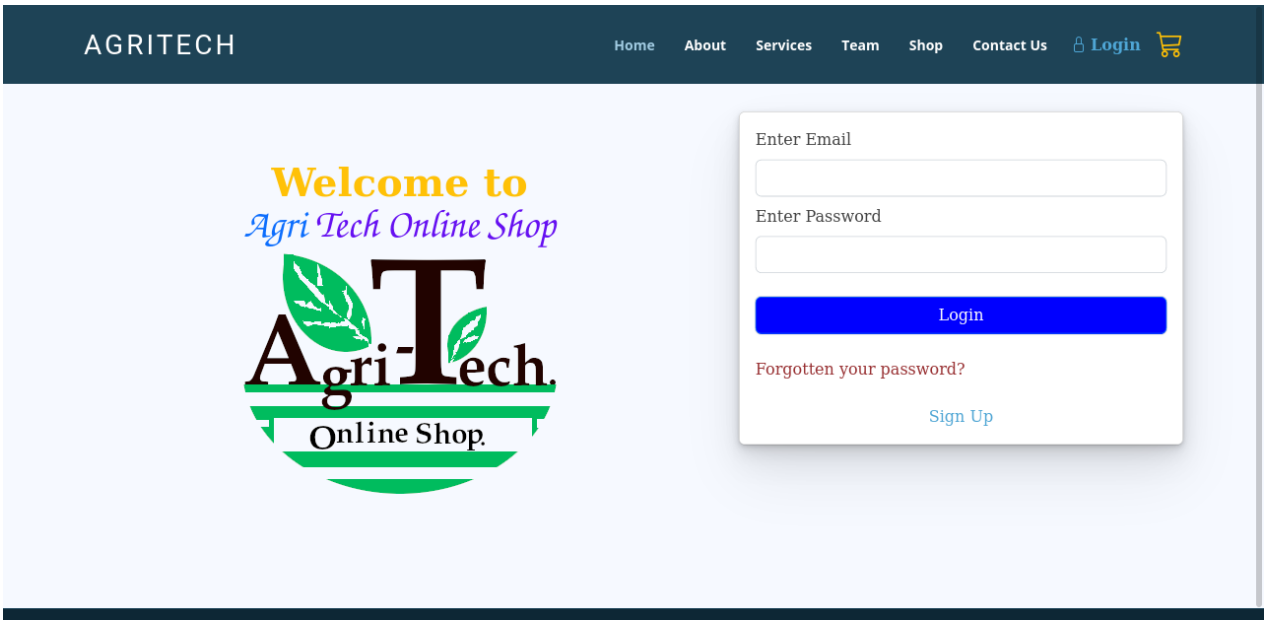

Figure 9 User interface.

Figure 4.1.4 A Login Interface.

The user should log in to Agritech online shop using the above interface. If the user is registered, he

should enter the email and password to log in. The user can also click on the Create Account button to register for the Agritech online shop the user may also click on Forgot password if they do not remember

their password and want to reset it.

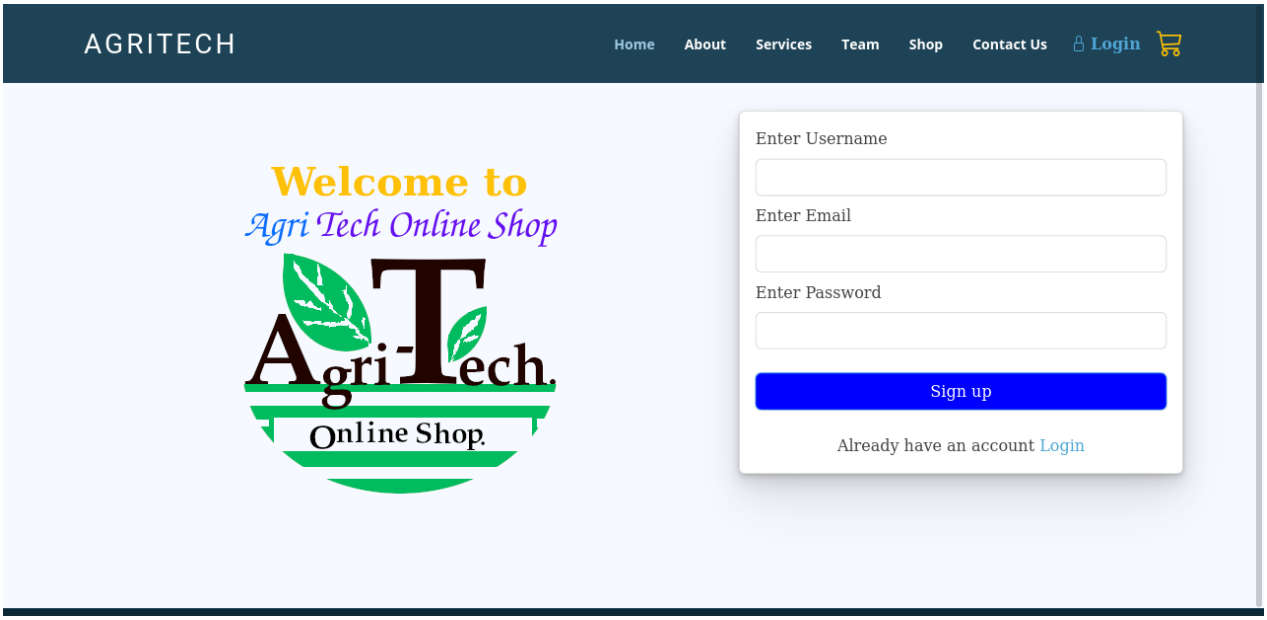

Figure 10: Registration Interface

If the user is not already registered, he can register for an account on the Agritech online shop using

the above interface. The user should provide a Username, Email, and should create a password. If the email id is already registered with the Agritech online shop a notification is shown to the user and he is not registered.

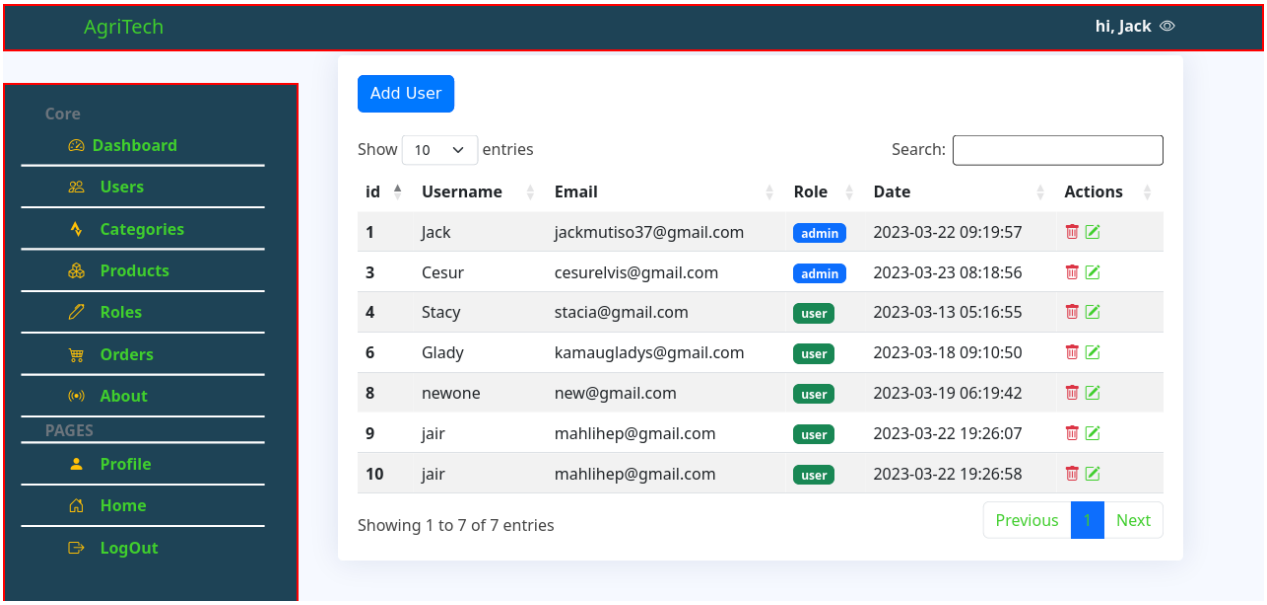

Figure 11: Users in admin section.

Admin can edit and delete user.

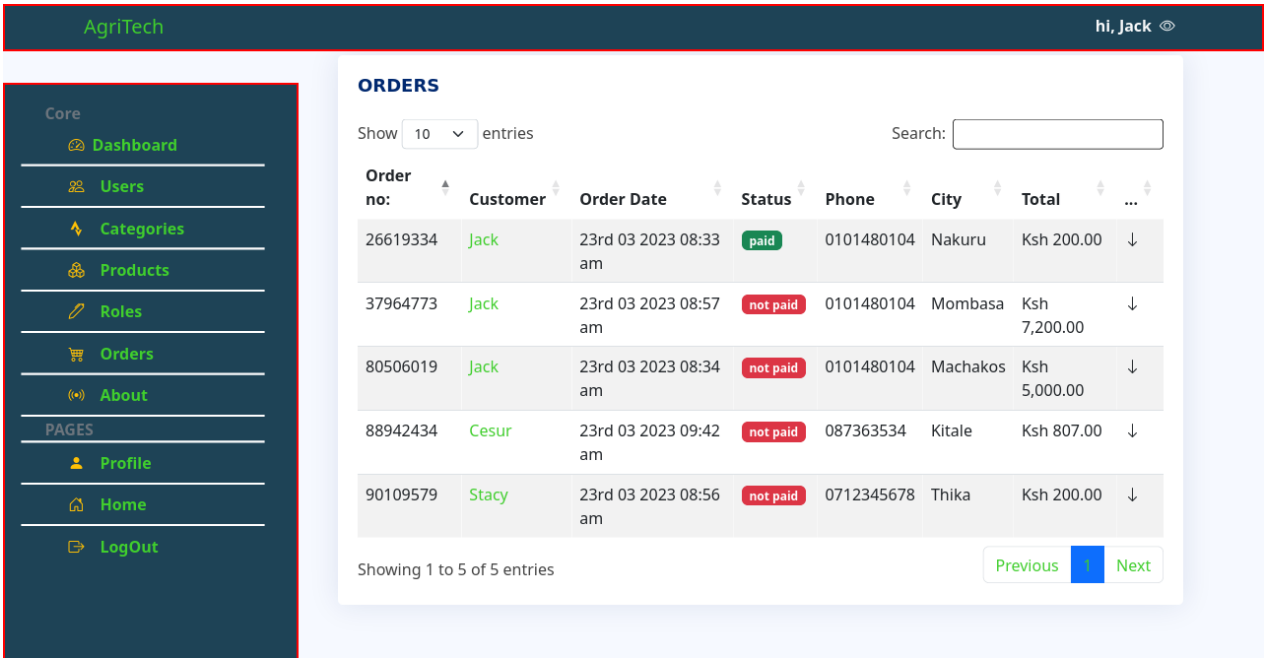

Figure 12: Orders in admin section.

Order ID - a unique identifier for each order.Customer ID - a unique identifier for the customer who placed the order.Product ID - a unique identifier for the product that was ordered.Quantity - the number of units of the product that were ordered.Price - the price of each unit of the product.Order date - the date on which the order was placed.Order status - the current status of the order, such as "processing", "shipped", "delivered", etc.Payment method - the method used by the customer to pay for the order, such as credit card, PayPal, etc. Shipping address - the address to which the order is being shipped. Billing address - the address associated with the payment method used to pay for the order. Order total - the total amount charged to the customer for the order.

4.2 BACK END DEVELOPMENT

Back-end development refers to the server side of an application and everything that communicates between the database and the browser.

4.2.1 DATABASE DESIGN MODELS.

A database model shows the logical structure of a database, including the relationships and constraints that determine how data can be stored and accessed. Individual database models are designed based on the rules and concepts of whichever broader data model the designers adopt.

There are many kinds of data models. Some of the most common ones include:

- Hierarchical database model
- Relational model
- Network model
- Object-oriented database model
- Entity-relationship model
- Document model
- Entity-attribute-value model
- Star schema
- The object-relational model, which combines the two that make up its name

One may choose to describe a database with any one of these depending on several factors. The biggest factor is whether the database management system one is using supports a particular model. Most database management systems are built with a particular data model in mind and require their users to adopt that model, although some do support multiple models. As for our team, we chose the Relational Model.

Relational model:

The most common model, the relational model sorts data into tables, also known as relations, each of which consists of columns and rows. Each column lists an attribute of the entity in question, such as price, zip code, or birth date. Together, the attributes in a relation are called a domain. A particular attribute or combination of attributes is chosen as a primary key that can be referred to in other tables when it’s called a foreign key. Each row, also called a tuple, includes data about a specific instance of the entity in question, such as a particular employee. The model also accounts for the types of relationships between those tables, including one-to-one, one-to-many, and many-to-many relationships. Within the database, tables can be normalized or brought to comply with normalization rules that make the database flexible, adaptable, and scalable. When normalized, each piece of data is atomic or broken into the smallest useful pieces.

Relational databases are typically written in Structured Query Language (SQL). The model was introduced by E.F. Codd in 1970.

Advantages of a database management system:

Controlling Data Redundancy:

In non-database systems each application program has its own private files, creating duplicated copies of the same data in many places. In DBMS, all data of an organization is integrated into a single database file, recorded in only one place in the database and not duplicated.

Sharing of Data:

In DBMS, data can be shared by authorized users of the organization. The database administrator manages the data and gives rights to users to access the data. Many users can be authorized to access the same piece of information simultaneously. The remote users can also share same data. Similarly, the data of same database can be shared between different application programs.

Data Consistency:

By controlling the data redundancy, the data consistency is obtained. If a data item appears only once, any update to its value has to be performed only once and the updated value is immediately available to all users. If the DBMS has controlled redundancy, the database system enforces consistency.

Integration of Data:

In Database management system, data in the database is stored in tables. A single database contains multiple tables, and relationships can be created between tables

4.2.2 DATABASE TABLES

Field name	Data type	Constraint
id	int(11)	Primary Key
username	Varchar(60)	Not null
email	Varchar(255)	Not null
Customer	int(11)	Primary Key
Order date	Varchar(255)	Not null
Status	Text	Not null
Phone	Timestamp	Not null
Delivery address	Varchar(255)	Not null
Country	Varchar(255)	Not null
password	Varchar(255)	Not null
Date	datetime	Not null

Table.1: Users Table

4.2.3 System testing

Software testing in an essential phase in the development life cycle of an application.

Testing ensures that the developed system meets its functional and non-functional requirements.

Two important terms in software testing are Verification and Validation. Verification is the process of evaluating work-products like requirement specs, design specs and test cases etc. of different development phases to make sure that they meet the requirements for that phase. It ensures that the system is built in the right way. Whereas Validation is the process of evaluating

the software at the end of the development phase to make sure that it meets the business requirements. It is used to make sure that the product fulfills its intended use and that the end product is built right. In this chapter we mainly validate the Agritech online shop to make sure it meets the requirements set initially.

Various other testing strategies have been adopted to make sure the correctness of the Agritech online shop. They are discussed in this chapter.

White-Box Testing

The testing procedure that will be used will be the white-box testing. White-box testing is the detailed investigation of internal logic and structure of the code. White-box testing is also called glass testing or open-box testing. In order to perform white-box testing on an application, a tester needs to know the internal workings of the code. The tester needs to have a look inside the source code and find out which unit/chunk of the code is behaving inappropriately. Internal software and code working should be known for this type of testing. Tests are based on coverage of code statements, branches, paths and conditions.

Black-Box Testing

The technique of testing without having any knowledge of the interior workings of the application is called black-box testing. The tester is oblivious to the system architecture and does not have access to the source code. Typically, while performing a black-box test, a tester will interact with the system's user interface by providing inputs and examining outputs without knowing how and where the inputs are worked upon.

Acceptance Testing

This is arguably the most important type of testing, as it is conducted by the Quality Assurance Team who will gauge whether the application meets the intended specifications and satisfies the

client's requirement. The QA team will have a set of pre-written scenarios and test cases that will be used to test the application.

Unit Testing

This type of testing is performed by developers before the setup is handed over to the testing team to formally execute the test cases. Unit testing is performed by the respective developers on the individual units of source code assigned areas. The developers use test data that is different from the test data of the quality assurance team.

The goal of unit testing is to isolate each part of the program and show that individual parts are correct in terms of requirements and functionality.

Beta testing

These will be done to give partial or full version of a software package for free to the potential customers with understanding that they will report errors revealed during usage

4.2.4 Deployment method

Software deployment is the process of remotely installing software on multiple or all the computers within a network simultaneously, from a central location. The term "Software Deployment" is generally used in the context of a large network *(more than 20 computers)*

One can deploy software in multiple ways using different deployment strategies. Our team ended up using Server Deployment strategy.

Server Deployment

"Server Deployment" includes the following:

i. End User Software installed on a networked device accessible by one or more persons who can independently operate the End User Software from another machine;

ii. End User Software installed on a networked device running as a service that accepts connections from other machines or applications (for example, a "headless" process to watch a folder or other data source for work originating from other machines), and

iii. End User Software deployed to a browser from a web server, such as an HTML5-based application, where the End User Software is not installed on the client machine, but is in use by the client machine while the user is connected to the web server.

Server deployments are typically priced based on the number of server CPU(s) cores that are available to the End User Software. Therefore, a server may run multiple instances of the End User Software and/or multiple VMs on a physical server machine with a specified number of cores and pricing will be based on the number of cores.

4.3 Conclusion and Future work

Agritech online shop is an essential app to have on a Smartphone. It is a personal security app that lets

you send notifications to certain people via text messages in case of emergencies on the tap of a single button. The app also keeps a track of your current location so that you always known the address of where you are. The text messages sent also have this location information.

Agritech online shop was our first attempt at a Web application. It gave us very good exposure

to the Web platform and Application development in general. The app enabled us in

understanding the basics of Web development and learning about SQL databases, Server to Client Side Communication through PHP, Google

Maps API for Javascript and performance testing of the app.

4.3.1 Future scope

Agritech online shops have a promising future as they can bring numerous benefits to the agricultural sector. Here are some potential areas of growth for agritech online shops:

1. **Increased efficiency: Agritech online shops can help farmers save time and money by providing a platform to buy agricultural inputs and products online. This reduces the need for farmers to visit physical stores, which can be time-consuming and may not always have the products they need.**
2. **Access to a wider range of products: Agritech online shops can connect farmers with suppliers of various agricultural products from all over the world, thereby providing access to a wider range of products than what may be available locally.**
3. **Improved market access: Online marketplaces can connect farmers with buyers from all over the world, increasing market access and enabling farmers to sell their products to a wider audience.**

4. **Data analytics: Agritech online shops can use data analytics to help farmers make more informed decisions about their crops, including information on soil health, weather patterns, and other factors that impact crop growth.**
5. **Sustainability: Agritech online shops can also provide farmers with access to sustainable agricultural practices, including products that reduce chemical use, improve soil health, and increase crop yields while reducing environmental impact.**

APPENDICES

Interview Questions

i. **What inspired you to start an agritech online shop?**
ii. **How does your online shop differ from traditional agricultural supply stores?**
iii. **How do you source your products and ensure their quality?**
iv. **How do you ensure timely and efficient delivery of orders?**
v. **What kind of payment options do you offer to your customers?**
vi. **How do you handle customer complaints and ensure customer satisfaction?**
vii. **How do you keep up with the latest trends and technologies in agritech to provide the best products to your customers?**
viii. **What are the biggest challenges you face in running an agritech online shop, and how do you overcome them?**
ix. **How do you see the future of agritech and your online shop's role in it?**
x. **What are your plans for the growth and expansion of your online shop in the coming years?**

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