

Implementing E-Commerce Mobile and Web Application for Agricultural Products: e-Farmers' Hut

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Abstract— In Bangladesh, the increased number of brokers has resulted in a price increase in the agricultural goods market. They acquire items from farmers at a discount and resell them to consumers at a premium. This deprives farmers, while customers pay an unreasonable price for basic essentials. This study aims to develop an e-commerce mobile and web application called 'e-Farmers' Hut' to facilitate direct producer-to-customer engagement. The application goal to maximize the advantages to producers and customers by eliminating middlemen's control. Both applications operate sequentially on the same database. Farmers and customers each have their profile to which they may submit the relevant information. Additionally, to optimize facilities use, also introduced an electronic payment method. Customers may see lists of available items that verified farmers have posted. The application has passed the testing process with expected outcomes. The technology has the ability to considerably simplify direct sales and purchases of items between farmers and consumers.

Keywords—E-commerce, Mobile Application, Web Application, Farmers, Consumers, Agricultural Product, Web Technology, Electronic Payment

I. INTRODUCTION

According to the Bangladesh National Agricultural Census, Bangladesh has around 16.5 million farmer families. The study was released during an event organized by the Bangladesh Bureau of Statistics (BBS) at the BBS auditorium in Dhaka [1]. According to the report, approximately 6.8 million farmers cultivate not their land. Agriculture is Bangladesh's most significant economic sector, contributing 19.6 percent of the Gross domestic product and employing 63 percent of the population. Agriculture throughout Bangladesh is very weather-dependent, and cyclones may take out entire harvests in a matter of a few hours. According to the World Bank, arable land in Bangladesh accounts for 61.2 percent of the land in the country (down from 68.3 percent in 1980). Due to the fast rising

population, the difficulties related to land ownership, and the complexity of inheritance rules, most farms are quite small [2]. The rise of middlemen's influence in local bazaars over the past several years. They acquire the goods at a cheaper cost from the producers and resell them to clients at a higher expense [3-5]. As a consequence, producers suffer significant losses and lose motivation to generate new items. On the other side, customers are forced to pay excessive prices for products. Thus, the whole operation is maintained and under the control of the middleman whom receives the most significant portion. On Jan 13, 2020, an article in The Daily Star [6] said that the middlemen's domination had reached an unsustainable level. After assessing the whole market condition, we determined that there is no solution possible that connects buyers and producers. Additionally, most people in our immediate vicinity often find it difficult to get fresh produce. Furthermore, they must pay large amounts to the 3rd party, especially when it comes to ordinary home shopping—a issue that no one seems to be able to solve. The use of the internet in farming has the ability to adjust the economy and farmers' lives [7-9]. E-commerce enables the development of new innovative marketing strategies in agriculture by connecting producers directly to customers [10]. Additionally, by merging the model with machine learning algorithms [11-15], customers may be able to get fresh goods [16]. Once implemented, e-commerce is expected to be more productive, transparent, and competitive. Objective of the E-Commerce's include the elimination of intermediaries, cross-border commerce, rapid delivery, and price transparency. Agriculture E-Commerce benefits farmers by enabling them to promote their goods on a bigger market and reach the end customer regardless of their location. Once agricultural E-Commerce is effectively implemented, it will help the producers economically and contribute to the country's economic development [17-19].

Researchers are seeing an increase in the number of consumers purchasing things online; however, ordering services

online is a new beginning for people to learn about. Many questions and apprehensions arise, mainly due to the lack of expertise and security that consumers have become used to while utilizing old techniques of accessing daily buying services. Furthermore, the flavor of freshness is no longer present. Chemicals are used to preserve the majority of items. A farmer is someone who provides meals for us but does not get enough money to pay their costs of production. Due to the influence of the 3rd parties who buy the goods at a cheaper price and sell it to the consumers at a higher price [20-24]. For this reason, we created an App on android and a website that would benefit both parties while also providing the highest level of security. Farmers and customers may connect with one another without the need for an intermediary using this approach.

II. LITERATURE REVIEW

Numerous agricultural E-Commerce sites are up and operating in Bangladesh, however they are still in their early stages [25]. Several elements have yet to be implemented, and agricultural commodities have yet to benefit from many ways. Many systems, including Chaldal and AmarDesh E-shop, have attempted to develop solutions, however there are currently no novel alternatives accessible. All of these companies' main product is an Android app.

Chaldal purchases goods from other parties. They keep food purchased from wholesalers for several days and then deliver it upon receipt of an order. They included their commissions after purchasing items from a third party. Which increased customer spending rather than depriving them of the taste of freshness. While farmers are still not receiving their payments in a timely manner. Chaldal chose to retain the intermediary between farmers and consumers [26]. AmarDesh E-shop [27] is self-sufficient in terms of producers and own agents. They purchase things directly from producers. AmarDesh E-shop, on the other hand, is expensive and lacks a partner application for service providers. It does not offer a professional Android application. As a result, the platform is unsuitable for providing an autonomous end-to-end service ordering process. For instance, after completed the booking process for a service, their customer management sends a customer care officer to get the client's agreement to schedule the service. As a result, Amar E-Shop has not provided a suitable venue for service partners to promote their work [28-30]. Chaldal and AmarDesh E-commerce platforms do not facilitate connection between consumers and producers.

Online Farmer's Hut is a web-based platform that is also available as an Android application. Our primary objective is to implement in order to facilitate contact between consumers and farmers. The whole ordering procedure is clear from beginning to finish, which sets us apart from the others. On the other hand, the suggested approach guarantees farmers' asking prices and eliminates the monopoly of intermediaries or whole-sellers. We, too, make no profit. Customers will pay the farmer's basic price. Additionally, we worked to simplify the interfaces of our applications and website, making them simpler to use for both farmers and consumers.

III. SYSTEM DESIGN AND ARCHITECTURE

'e-Farmers Hut' is an online service consisting of a website and an Android application. This study is largely focused with establishing customer-producer communication. The whole ordering process is transparent and open. The entire method is clear from start to end. By directly providing customers with the farmers' asking price, we are removing the middleman's privilege.

Our primary product will be an Android application. However, in addition to the app, a responsive website will be accessible for both consumers and service providers. Our services include the following: 1. A website for consumers to browse and buy, 2. A portal for providers, 3. A customer-facing Android app, 4. A service provider-facing Android app, and 5. The platform's dashboard. The progress of the full project is shown in Fig. 1. To provide a comparable experience for consumers across platforms, identical services will be made available on Android and the website. Professionals and consumers will also access an app and a web dashboard.

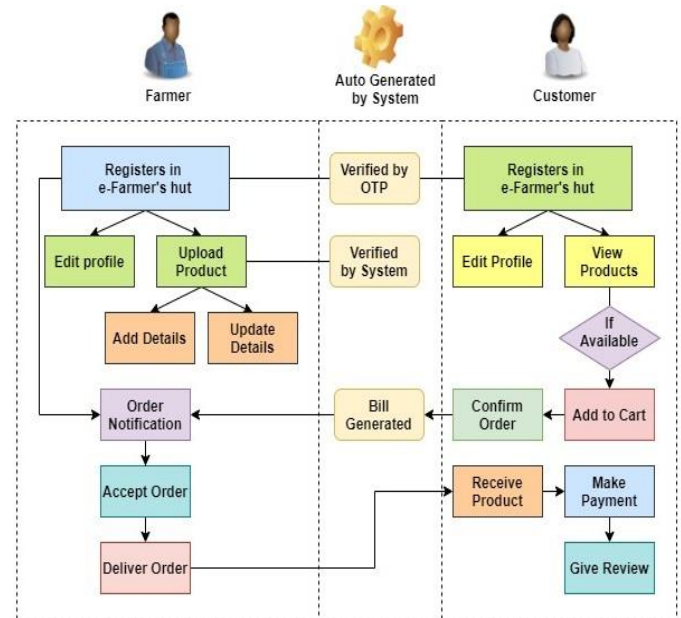


Fig. 1. The proposed system's workflow diagram.

A. Features of the System

Platform Dashboard is a platform utilized and monitored by admins. Below mentioned functionality has been included in platform dashboard functionality.

1) **Category Management:** The platform administrator uses this module to manage services categories and subcategories. Several possible categories include the following:

- Service provider dashboard: It is used by the service provider
- Registration and login:
 - ✓ Apply for verification
 - ✓ Login
- Manage services:

- ✓ Select one or more services from the service category list provided by the platform.
- ✓ Provide price and estimated delivery time of the service.

- Manage orders:
 - ✓ View the orders
 - ✓ View customer details
 - ✓ View order history

2) **Customer Site:** Customers and visitors use it as the platform's home page. Viewing of services will be available. Users first must log in before the user can place an order.

- ✓ Registration and login
- ✓ Trending and best-seller services recommended services
- ✓ Browse service categories and search for services
- ✓ Add service to cart
- ✓ Provide location, service delivery place, and time
- ✓ Pick one from available professionals and place an order
- ✓ Order history and ongoing orders
- ✓ Apply promo code

- ✓ Manage the price of his/her services
- ✓ Opt out from receiving service
- ✓ Rate customer after providing service

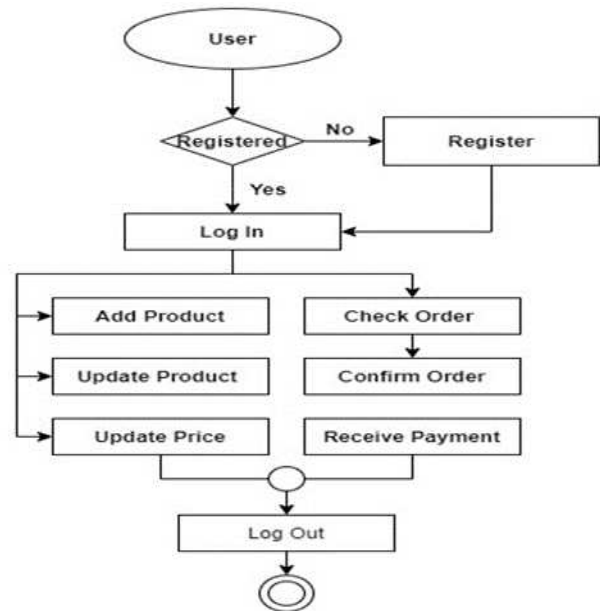


Fig. 3. Flow chart diagram of the farmer's activity section.

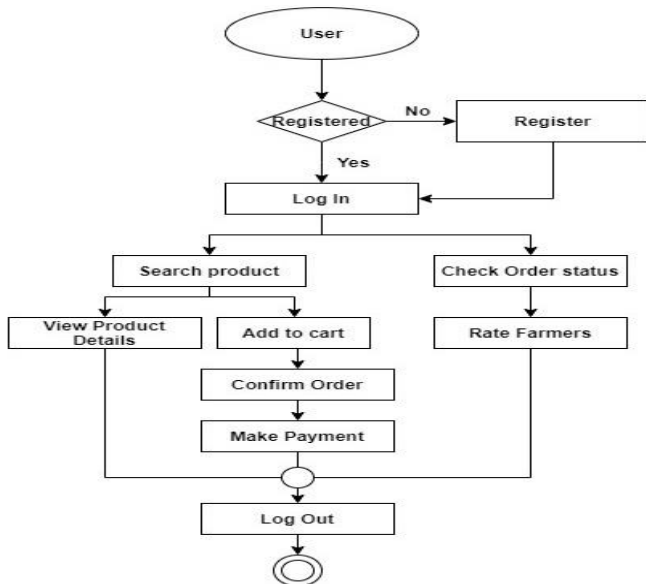


Fig. 2. Flow chart diagram of the customer activity section.

3) **Producer Site:** It was developed with the service provider in focus, rather than the end user. It would have the same features as the partner dashboard site. It also has the following features, which are briefly described below:

- ✓ Login Apply for registration
- ✓ Update profile and business information
- ✓ Get notifications of received orders
- ✓ View previous order history

Customers may immediately log in using their mobile phone number and OTP. Customers are first given several choices. Numerous services are classified. Before purchasing, consumers should select one or even more products in their shopping basket. But, on the other hand, customers want many services, they must all belong under the same general category. Orders must be placed separately for each category of services unless numerous services are purchased in a single order. After selecting services and their numbers, the customer will enter the place where services will be provided and the desired arrival day and time. A notification will be sent to the selected producer with the consumer's mobile numbers, address, and a list of desired services. After the producer accepts the order, the customer will be notified and given the contractor's name and contact information. Orders that the producer does not accept are immediately sent to the platform's next best available employee. As once requested, services are executed satisfactorily for the customer, the applicable charge is payable. It is verified as quickly as the producer pays the cash amount. Customers have the ability to modify their data. The customer can see a record of all previous orders.

Workers must first register on the website by providing their name and telephone number. The worker selects a services sector in which he is an expert and wants to get orders. The platform's administrators will next authenticate his identity and competency. Only confirmed farmers are matched with customers. The employee has the opportunity to update their personal details, such as the service category for which they are employed and the number of hours worked. The worker may walk away from the terminal for a short moment. The worker gets access to order data as well as a profit report.

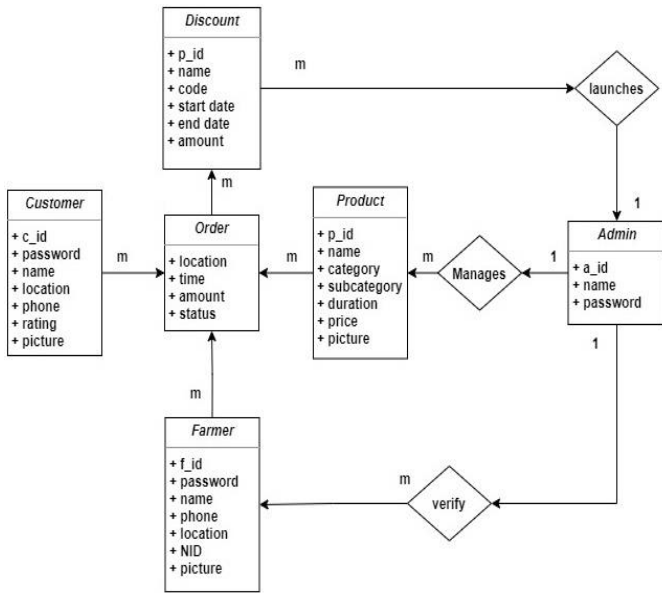


Fig. 4. The data model of the proposed system.

IV. IMPLEMENTATION AND RESULT

Our aim with this study was to demonstrate the proposed mobile applications and website while also explaining the categories, subcategories, and how they will be maintained in the future. Here is a graphical tour of the project from start to completion, including Web-based and Android-based features.

A. Web-Based Features

1) **Home Page:** The administrator panel has features that benefit the marketplace's moderators. Admins may perform CRUD operations on various entities, including categories, services, and workers. Consumers may use this site to search for products and buy a wide variety of services. We want to simplify the customer experience by designing a simple user interface.

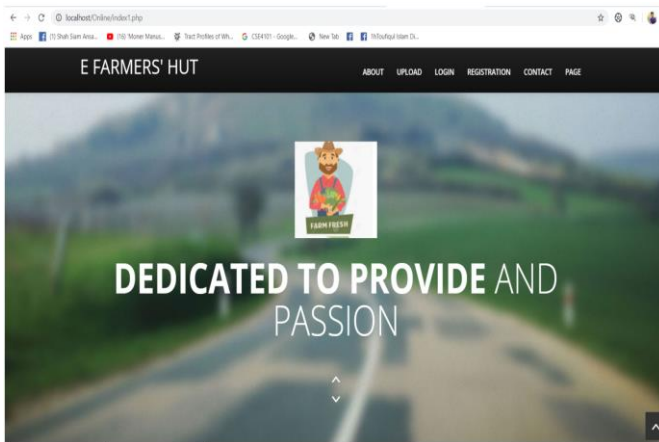


Fig. 5. Home Page Screenshot of the customer site. It is mainly contained in the category link.

2) **Login Page:** This project has login function. Instead of a name, the user's phone number is used to create a unique identifier.

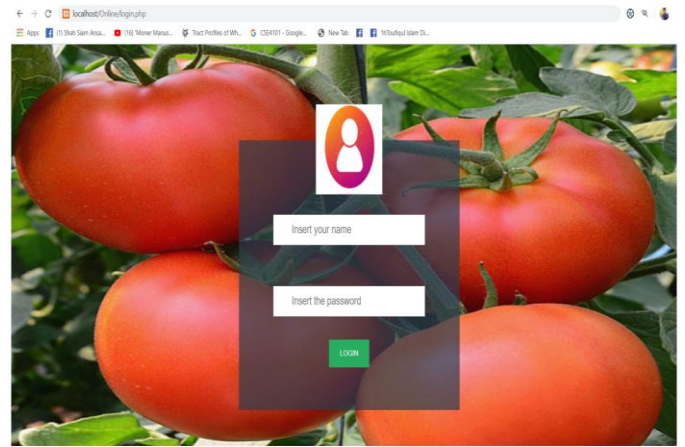


Fig. 6. Login Page.

3) **Service List:** This section includes a collection of services organized by category and subcategory. For instance, a page may have all services classified as "Tomato" subsection of the "Vegetable" category.

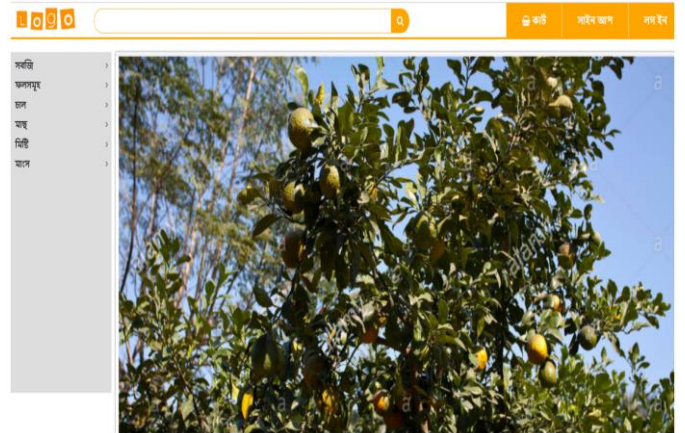


Fig. 7. Service List Page.

4) **Product Showing Page:** The View Products Information page contains information about a product, such as the product's name, description, and picture. The service overview page may also function as a platform for customers to place orders.

Available Vegetables are							
id	product name	product image	quantity	price	location	producer	contact
2	Tomato		200	35	Lalmonihat	Sovon	01712058236 Buy
3	Alu		300	17	Bogura	Rahim Sheikh	01712688152 Buy
4	Fulkopi		200	23	Gazipur	Kamal	01712788934 Buy
5	Badhakopi		150	19	Srimongal	Shammy	017127823436 Buy
6	Grapes		500	70	Dhaka	Brishy	015524252565 Buy

Fig. 8. Product Showing Page.

5) **Order Page:** Customers will be able to use the order page to make purchases for as many of the following goods are in stock.

Quantity
10

Location
Dhaka

Name
Tomato

Producer
Manik Mia

Contact
01738009905

Submit

Fig. 9. Order Page.

6) **Invoice and Payment:** Customers are allowed to view both their invoice and the payment method used to generate it. Numerous payment methods are available, including mobile banking and credit cards. Payment methods are as simple as clicking and paying.

INVOICE FOR SHOPPING

product name	quantity	Price	location	producer	contact
Tomato	20	700	KUSHTIA	Manik Mia	01738009905?

Proceed!!!

bKash NexusPay

Bkash Nexus pay Continue With Cash

Fig. 10. Invoice and Payment Page

7) **Category, Subcategory, Service of Edit Panel and order View Panel:** This section manages categories through the CRUD data management mechanism. The administrator may personalize the symbol and title of each category. Administrators have the identical set of categories as the rest of us.

The services marketplace organizes the products offers into categories and subcategories. Each of the primary categories has several subdivisions. This manner, users would be able to locate the services they require much more quickly.

Administrators can keep track of all customer orders using the order view page. Order elements include the client's name, the phone number assigned to them, the service they requested, and the fee.

This market is focused on service provision. Administrators may modify the settings for numerous services using the Service Edit Panels page. Admins manage and administer services by

performing CRUD activities on them. The name, category, status, and services images are all characteristics. This feature enables users to modify all of those settings.

B. Android Based Features (For Consumers)

The marketplace application was constructed to enable users to browse services and place orders after easily selecting a product. Users must first input their cell information in the login section in order to access this app. Additionally, buyers can view a record of their previous purchases.

1) **Home page:** It contains both categories and several of the most often used service groups. A search box is located in the top-right corner of the page. Below the search bar, there is an advertisement.

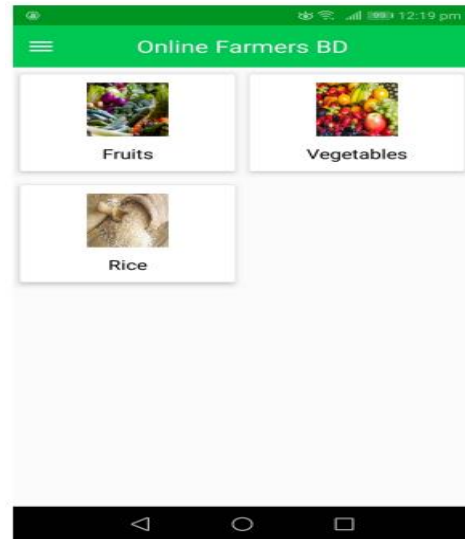


Fig. 11. App Home Page.

2) **Profile page:** Users may easily navigate the subcategory within each category by simply shifting left or right. The client's profile page contains information, including their names, mobile number, and address. This website allows users to change their information.



Fig. 12. App Profile Page.

3) **Cart:** When customers make an order, it is sent to the storage unit, which holds all necessary products until the provider places the order. Items in the cart may be modified or deleted.

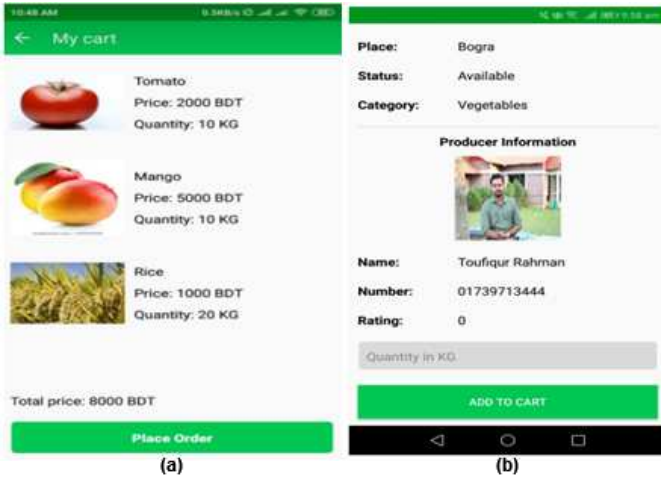


Fig. 13. (a) App Cart, (b) Product Add Page.

4) **Order History Page:** It includes a unique order id, an invoice, and a status that shows where the item is now in the process.

5) **Payment Page:** After a successful purchase. The customer must pay for the money. To make things easier for customers, we have added an internet banking option and cash-on-delivery.

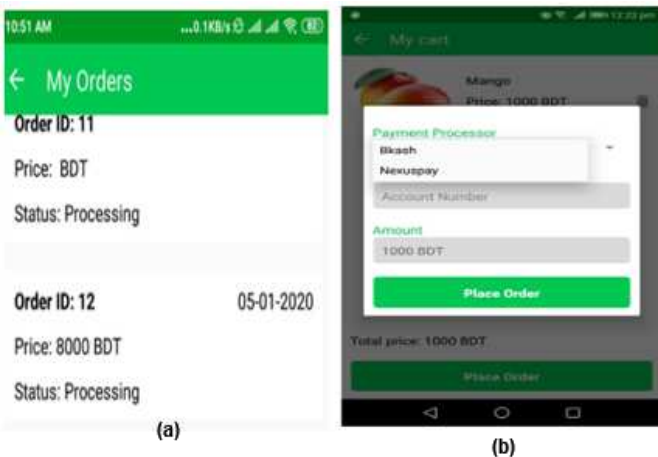


Fig. 14. (a) Order History Page, (b) Payment page.

C. Android Based Features (For Producers):

Producers may use this function to keep track of their products order, delivery, shipment, and pending status. They may input product information and quantities in accordance with the item’s availability status.

1) **Registration:** A producer must register and give general details, as well as the kind of product he produces and the quantity he produces.



Fig. 15. Registration Page.

2) **Profile Page:** A producer may inspect goods that he may have placed and may also upload a product with information using this website.

3) **Product Delivery Info Page:** From the menu bar, users may choose between two options: 1. The pending side, and 2. the completed side. Once delivery is complete, the state will change to deliver. A system-generated message is provided to the producers in the Waiting section once an order is placed. Items that are still in the queue will be kept remain until they have been sent. An item is received appears in the app's finished portion (Finished part). Producers have access to details on what he has so far delivered.

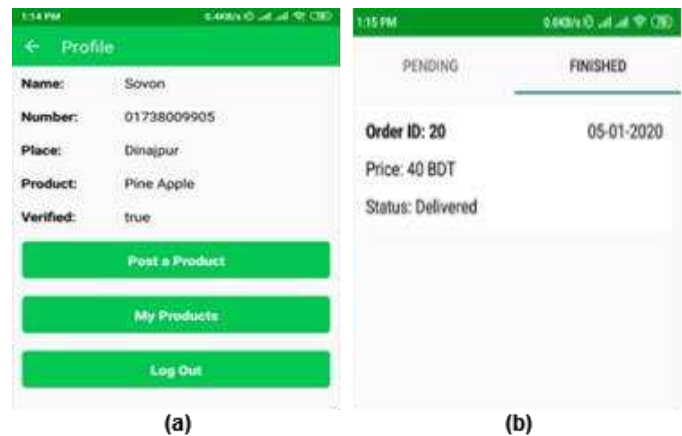


Fig. 16. (a) Profile Page, (b) Product Delivery Page Info.

D. Testing Implementation

An experiment is an assessment report (Table I) for a specific test scenario that comprises a variety of data about tests, preconditions, expected outcomes and obtained outcomes used to verify compliance with a defined requirement.

TABLE I. CASE STUDY: E-FARMERS HUT PROJECT TESTING

Case Study	Test Input	Expected Outcome	Obtain Outcome	Status
Farmer Registration Form	Personal Information (Like Name, Number)	Sign up for the system	Register Successfully	Pass
Registration of Consumers	Personal Information (Like Name, Number)	Sign up for the system	Register Successfully	Pass
Administrator	Username and Password	Login successfully and access the entire system	Successfully login and access the system	Pass
Create an account (Farmer and Producer)	Username and Password	Login into the system using proper permissions	Successful Login	Pass
Product Description	Name of the product, season, location, price, quantity, and category	Product successfully added	Added successfully	Pass
Add to Cart	Choose a product and a quantity	Successfully Place an Order	Successfully ordered	Pass
Payment Method	Mobile banking number, credit card information	Payment Completed	Payment Successful	Pass

Nothing can be established until it is proven in the current world. As a consequence, after finishing the project in its entirety, we began evaluating the implementation in different areas and verifying the validity of the findings. It is vital to comprehend the project's operation. Is that really prepared to go or not? Because it is critical for both the creator and engineer. Obviously! This sort of conclusion may reveal the fundamental status of any system. Consequently, we attempted to execute the test many times in various settings. There is no doubt about that! It is precise and effective. The summary (Table II) may accurately and clearly reflect the test outcome.

TABLE II. TESTING RESULT OF THE PROJECT.

Number of Unit Test Case	100 % Success in First Iteration	Less than 100%	Total Succession in %
Total: 7	4	3	57%
Total: 7	4	3	57%
Total: 7	6	1	86%
Total: 7	7	0	100%
Total: 7	7	0	100%

V. DISCUSSION AND LIMITATIONS

E-Farmers thinks it can give clients a better way to locate local services while also empowering service providers by finishing the Android app and website architecture. Our service marketplace links clients with authorized service providers through a location-aware app and web platform, enabling them to acquire estimates from a vast number of support companies in a matter of seconds.

A. Security Issues

Android's open-source nature is both an advantage and a disadvantage for developers. Android users are often the target of malware and assaults, but Google reacts quickly by issuing security upgrades. Regrettably, the majority of people do not frequently update their devices. Thus, app developers are often forced to manage user information in a self-serving way, whether by encrypting it entirely, adding additional security measures, or completely ignoring user input.

B. Internet Connection speed matters

A slow internet speed can make it increasingly challenging to do operations such as fetching data and reports or publishing the results of a query on a website or perhaps an Android application.

C. OS adoption fragmentation

Android device testing is a tremendous job. The issues with different operating systems are a challenge when it comes to software customization. According to a 2018 Google research, a large number of Android devices continue to run out-of-date varieties of operating systems launched during 2014, 2015, and 2016.

D. Device fragmentation

Despite the huge number of mobile manufacturers, the number of devices issued by these firms, each with its own display size, sensors, performance issues, and graphics drivers, is still manageable. Google gives a long list of Android (and iOS) devices with comparable screen dimensions and resolutions in the written paperwork for material design. When older smartphones cannot handle advanced sensors or other capabilities, our application must be regulated by adjusting the app quality. However, this does not make development and testing any simpler.

E. Copyright problems

We can release our software considerably quicker since Google Play checks and approves apps earlier than the App Store. However, there is a disadvantage to this gain. Because no trademark or copyright checks are in place, anybody may submit software that incorporates features or content already used in other products even without recognizing it. Second, there is a possibility of copyright infringement if Google Play releases an app that copies our original solutions.

F. Others Constraints

Bangladeshi farmers and producers in general are still mostly unaware of the internet and other new technologies. Administering the system will be challenging if have not even basic computer knowledge. Sometimes data posted online may be utilized freely on the webpage for evaluation by others, which can affect one's company. Users, authors, and administrators of the website may all face technical difficulties such as hardware malfunctions, limited storage capacity, and other copyright violations.

VI. CONCLUSION AND FUTURE WORK

Over the last five years, the rapid growth of internet use has helped surrender modern technologies and increased access to cloud services. Agricultural E-Commerce seems to have the ability to considerably improve financial circumstances for farmers by removing intermediary costs and creating a direct relationship between producers and buyers. Existing internet commerce infrastructures are incapable of accomplishing the aims of agricultural e-commerce. As a result of our analysis of earlier work, we planned and constructed both Android and Web applications. This study presented e-Farmers' Hut as a channel between farmers and customers. The authors develop the both web and mobile apps. The application completed the testing process without encountering any errors. The application's features are designed to be user-friendly for both clients and farmers. The application will be created in the Bengali language in the future to make it more accessible to users. Moreover, the application would be made lower in size and more user-friendly, since internet connectivity is not always reliable in rural areas where farmers live.

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