Design of an online transporter for a pharmaceutical store: A B2C E-commerce platform

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Abstract

Many enterprises have opted to concentrate on easily accomplished and delivery of goods and services in today's world of fast processes and order transactions. The health industry is one of the big sectors that can benefit from this kind of mobile technology. Many customers need to physically find medicine at the nearest pharmacy. This traditional way of buying medicine may not be applicable to those people who urgently need medicine. People nowadays seek smooth and fast services where they can buy anything they need in just one click on their mobile application. This study aims to develop a mobile-based delivery service of medicines where consumers can buy the medicine, they need using their cell phone. This will not only save consumers time in taking the long queue, but also the time and effort involved in going to a nearby pharmacy.

Keywords
Mobile based delivery, mobile app, pharmacy, order transaction, mobile technology

1. Introduction
The health industry is one of the big sectors that can benefit from this kind of technology. Many customers need to physically go and find medicine at the nearest drugstore. This traditional way of buying medicine may not be applicable to those people who urgently need medicine. Any network or system that tracks sales, orders, inventory, and distribution, as well as allowing the necessary individuals, procedures, and relationships to make their way to the customers who ordered them, is known as an order management system. Customers, Sale Channels, Product details,

Inventory levels and location, Suppliers for buying and receiving, customer service for returns and refunds, order printing, choosing, packaging, sorting, and shipping are all examples of multi-dimensional systems that are needed (Eshetu 2016).

Stock management is part of the order management scheme. Stock control is the process of buying, storing, and using a product's inventory. They include the storing and handling of raw materials, components, and finished products, as well as the maintenance of raw materials, components, and finished goods. The aim of inventory management is to track one of the company's valuable assets. It tracks the number of stocks, specific details of each product, and expiration (Bolingo 2017).

The researchers proposed an online ordering system, which is a method of ordering medicines over the internet that can be used in any pharmacy. The biggest benefit of our system is that it makes the shopping process more efficient for both the consumer and the pharmacy. This system also decreases the workload for the drugstore by automating the entire order-taking process. Once an order is placed on the app, it is entered into a database and then retrieved by a mobile app on the drugstore's end in almost real-time. All details will be displayed per order along with the associated options and delivery information. This enables store pharmacists to rapidly monitor orders as they are placed and deliver the correct medications with the lowest number of errors and uncertainty.

1.1 Research Question

How effective can a Medicine Delivery mobile application in terms of user-friendliness and satisfaction?

1.2 Objective of the Study

The proposed project focuses on a mobile techonlogy that will help the users to find and order medicine that will be delivered directly to their doors. The aim of the project is to create a mobile-based application that will allow the pharmacy to track, interact, and record operations-related activities.

1.3 Scope and Delimitations

The project is focused on creating a system that will connect the user with the pharmacy and offers delivery service in their area and lets them order, choose, and pay. This project will help consumers to buy non-prescription and prescription-only medicine from the pharmacy even without personally going. For the customers, this mobile application will be able to show the available medicines and search for a specific medicine of choice where the application may show if it is in stock or not. On the admin's side, they may modify the medicine's availability, add, and archive from the database, update status order, assign orders to a shipper, and check sales reports.

The system will generate a report conforming to information needed by the management via the app. This will require the input of necessary data and records of medicine ordering and delivery and then a report is generated. The project will not run-on Apple devices, as the researchers do not have the resources to develop iOS applications.

1.4 Significance of the Study

The proposed project will benefit those people who live in a place far from a pharmacy, people who don't have time to go out to buy medicines, and pharmacies. The medicine ordering and delivery system will use the proposed mobile application to help consumers and management limit workload in the current system, build a system for online purchase and delivery of medicines, and maintain an accurate record of ordered orders and deliveries. This study also targets small sized pharmacy, and from this proposed application, they can use this directly if they opt to deliver their products online.

Going out to buy from pharmacies has become a hassle as time is very significant. People nowadays seek smooth and fast services where they can buy anything they need in just one click on their mobile phone.

The proposed mobile-based delivery service of medicines where consumers can buy the medicine, they need using their mobile phone. This will not only save consumers time in taking the long queue, but also the time and effort involved in going to nearby pharmacy (Chordiya, & Garge 2018)

2. Literature Review

In the last 10 years, the use of computers in pharmacies has grown rapidly. Computers have simplified many traditional pharmaceutical processes allowing them to step up their work activities. The pharmacist's working conditions were also subject to drastic changes because of computerization. This study focuses on a pharmacy stock inventory system that allows customers to monitor inventory levels and manage their stock digitally.

The system sends out alerts when drugs are about to expire, keeps track of the quantity of each drug, and runs the entire inventory system using a searching algorithm technique. The system keeps track of how many medications they have in stock. It helped the end-user to critically know the details of each drug, the stock balance, and other important properties needed for the inventory. The study's main goal is to include automation, which includes data entry, retrieval, and stock control, as well as tracking drug dispensing trends, reporting, and statistics generation. It also looks at how the drug store operates and how it handles product flow with internal and external variables including the dispensary and suppliers. Receiving prescription medications from manufacturers, handling medication orders, selling and auditing medicines, and returning expired medication to suppliers are all covered by the program (Eshetu 2016).

Today, healthcare companies are searching for ways to boost their daily operations by minimizing costs without affecting/improving pharmaceutical processes. These companies think of a way to function better by investing in a system that provides accurate medical supplies, medicines, and equipment. An inventory management system aids these businesses in completing tasks such as transactions, ordering goods, monitoring inventory movement, and generating reports. The aim of this study is to create a computerized inventory management system. It was created in a DOS environment and is used to manage their daily operations, such as purchase orders. This framework was created in a client-server environment, with an interface application written in Visual Basic 6 and a database created in Microsoft Access 2000. Prescription, dispensing, billing, purchasing, and inventory management are all essential positions in a pharmacy, and this method streamlines them all. This system involves item entry, purchase orders, and item management for quick mark-up on the products (Bolingo 2017)

Inventory management is defined as procedures, policies, and techniques used in maintaining the number or amount of each item in the inventory. It has a huge effect on the pharmacy's profitability, resulting in increased cash flow, excellent customer service, a stable partnership with vendors, a positive return on investment, and reliable forecasting of potential inventory needs. Inventory management systems are designed to keep manufacturing, sales, and/or customer service at a constant level at the lowest possible cost (Maharaj et. al 2016)

The Internet has evolved into a platform for purchasing goods, services, and information. Purchasing drugs over the internet is no exception. In 2018, a survey was used to perform a cross-sectional exploratory analysis. The aim of this study is to learn more about how much people purchase drugs online and how they feel about it. The survey was completed by 1055 people. According to the survey results, most respondents (82.65%) were aware that drugs can be purchased online, and 44 (4.17%) had previously purchased medications online. Respondents chose pharmacy units as the best source of drugs while rejecting online pharmacies, reflecting significant differences in attitudes toward different pharmaceutical supply networks.

The E-Pharmacy application includes non-prescription and prescription drugs. This is a mobile-based application where customers can upload their scanned prescriptions to buy medicine. Even though this is working digitally it is still checked by a team of registered pharmacists, before being forwarded to a pharmacy store. Since a team of registered pharmacists has access to the process, they can answer some symptoms by supplying some non-prescription medicines. Time-consuming, higher price, and inconvenience are the cons of having this conventional pharmacy (Chordiya and Garge 2018).

Automation in drug inventory management saves personnel time and budget. In today's time, almost everyone wants to do online shopping rather than going to the store itself because it saves more money than usual. Shopping for medicine online will be very much helpful because it saves not only people's time and money but also fuel because one pharmacy may not have the medicine that you are looking for so you will need to go to another pharmacy just to find the medicine that you need. Online shopping is also now a modern way to shop for your needs (Awaya et. al 2016).

Pharmacists have many jobs in the hospital including inventory management, dispensing, in-hospital preparation, aseptic mixture, and adjustment of injections, drug information service, etc.; but they are limited in number due to the hospital budget that needs to adapt to various changes. Because of the limited budget in the hospital employees are forced to use automated systems that will still help them to do certain jobs that the pharmacists were doing previously. The effect of automation on inventory systems was good because it reduced the workload of the employees even their time using this system, also because of the continuous improvement of the system it became a cost-effective one (Sharma et. al 2016).

Clients of local area pharmacy-based wellbeing improvement activities express a significant degree of fulfillment. In local area drug stores, if they are to be fully used, activities to raise public awareness and acknowledge the role of the pharmacist in providing advice would be essential. Further investigation will be needed to determine the impact of any changes in the premises on the public's perception of the level of security in drug stores (Samanta 2015)

The Internet has become a way to purchase products, services, and products. Buying medications online are no exception. A cross-sectional explorative study using survey was conducted in 2018. The objective of this study is to gather information on the frequency and attitudes of consumers buying medications online (Bessell 2003). A total of 1055 consumers completed the survey. The survey result shows that most of the respondents (82.65%) were aware that medications can be bought online while 44 (4.17%) respondents used to obtain medicines online previously. Respondents selected pharmacy units as the most suitable source of drugs while opposing internet pharmacies, indicating substantial gaps in attitudes toward various pharmaceutical supply networks (Bessell 2003).

Many consumers will obtain medications online in the future. At the present time, there is a risk of consumers buying medicines from illegal or online pharmacies that are not verified. Promotion campaigns are suggested to inform the public about the safety in buying medicines in online pharmacies, as these ways can prevent consumers' safety threat (Bessell 2003). In a subscription based model, determining the right demographic and the corresponding set of strategic processes to continuously expand the business and preserve customer retention over time, provide a real yet realistic solution to the demographic's specific set of problems, create a unique and relatable customer experience, acquire a substantial online presence through engaging marketing, and provide an overall pleasant customer service are all key factors to a successful subscription-based business model (Blancaflor & Julian, 2021). Subscription-based is a feature considered in this study.

3. Methods

The researchers used the Rational Unified Process (RUP) method (see figure 1) in developing the proposed system. This method allows the researchers to make new versions of the product for every cycle. Every iteration will consist of the development of an iterative software development process. It helps avoid cost from being wasted and avoids unforeseen construction costs because it has a clear plan for each phase of the development process. The RUP process is divided into four stages. The inception, elaboration, development, and transformation phases are all included.

Presented below are the functional and non-functional requirements, derived from the Requirements phase of the RUP model.

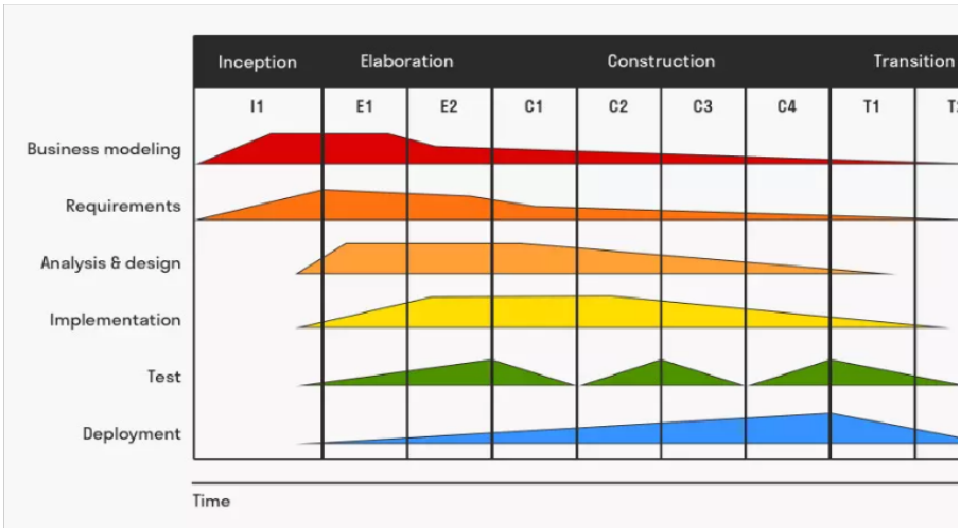

Figure 1. Rational Unified Process

Functional Requirements

- User's login authentication must be present
- User must be successfully login if the phone number and One Time Password (OTP) entered are correct
- User must be able to search the medicine
- User must be able to track order
- The system should make a notification to the user if orders are confirmed.
- The system must be able to generate
- reports like invoice
- The admin must be able to modify the database

Non-functional requirements

- The system must be user-friendly for the user. Users with authority should be able to log into the system with ease.
- Response time should be smooth and quickly managed. It must perform its tasks without any bugs and is well-tested.
- The system should be able to adjust to different features/updates made in the future.
- It should also be easy to manage and control. The system should always be available and easy to access.
- The web application will specifically run-on computer devices for more ease of access. The database is to be flexible and embedded.
- The system must maintain different details and complete records and is properly stored in a database.

In the Analysis and Design phase, the researchers have created uses cases, database design, system architecture, and mockup design. Mockup design of the developed mobile app is presented below.

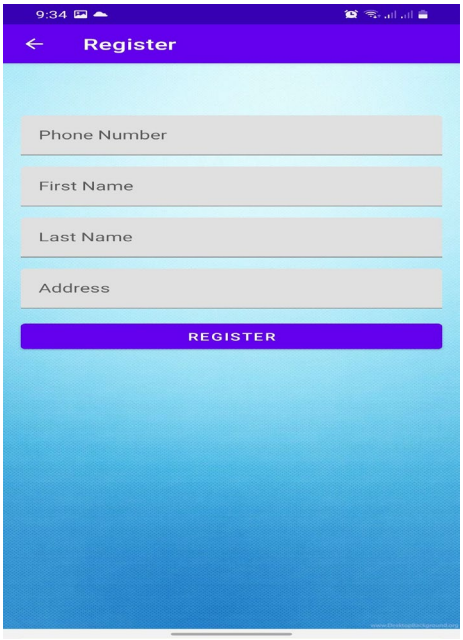

Figure 2. Register & Medicine Page

As shown in figure 2, users are required to register and fill out these necessary details: Phone number, first name, last name, and address. In the medicine page, all necessary details related to the medicine are displayed here such as name, dosage, description, price, & image.

In the customer cart page (see figure 3), all medicines added to cart by the customer are displayed here. Customers can modify all items on the cart. The prescription page, as shown in figure 2, in the developed mobile app, medicines are required to submit a prescription before checking out. After successful uploading of prescription or completed modifying items on the cart. Customers may now check out their order. The system will notify the customer once the order is acknowledged and received by the pharmacy.

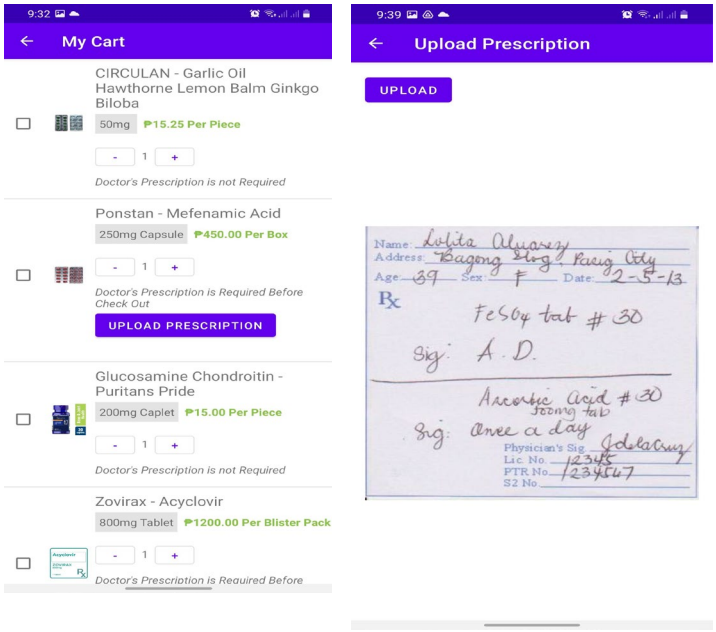

Figure 3. Customer Cart & Upload Prescription Page

Presented in figures 4 is the design of the systems architecture of the proposed system. As shown in the diagram, the mobile app is accessible by the target users through the Internet. Database used in the system is SQL and an admin user who has total access to the functionality of the system, has access to the servers and file storage as well.

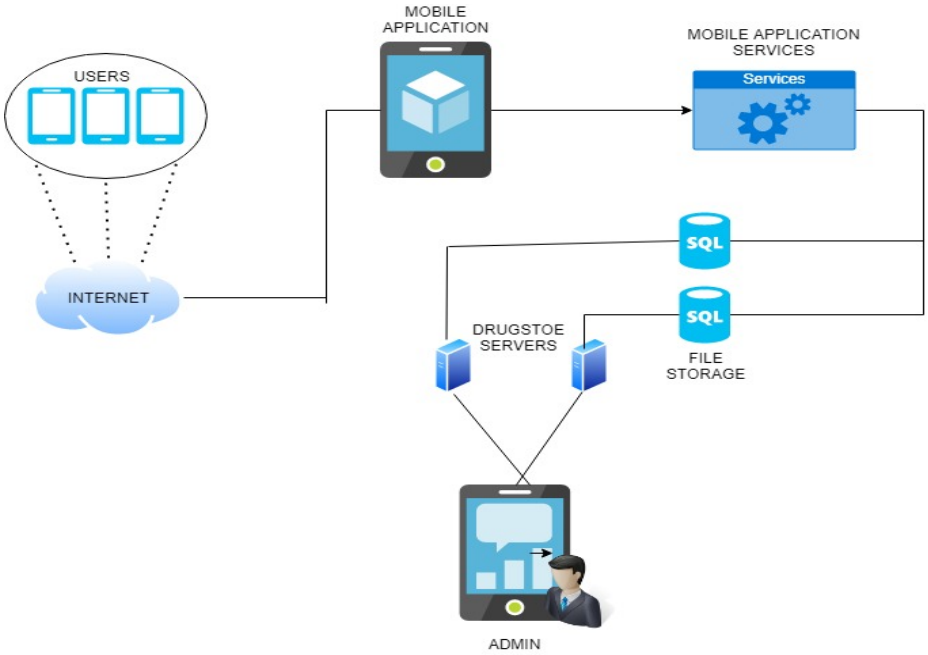

Figure 4. System Architecture

4 Data Collection

Usability test was conducted in this study, conforming to the Testing phase of the RUP software methodology model used in this study. The purpose of this UAT is to know whether the objectives of the proposed system were met. UAT Questions set in this study are classified based on their characteristics: user-friendliness, satisfaction, and effectiveness. The consistency questions assess the degree to which the application's content is acceptable to the target users. The term "user-friendly" refers to systems that are simple to operate. It is user-friendly, which means it is simple and easy to understand and learn. A user-friendly interface should have the following characteristics: accessibility, neatness, and dependability. The effectiveness tests the ability to be successful or the objectives are met. The visualization questions test the effort to help the users understand the data by placing it in a visual context.

5. Results and Discussion

The UAT Questionnaire is divided into two: system functionality and system usability. The User Acceptance Evaluation results for system functionality is shown in figure 5.

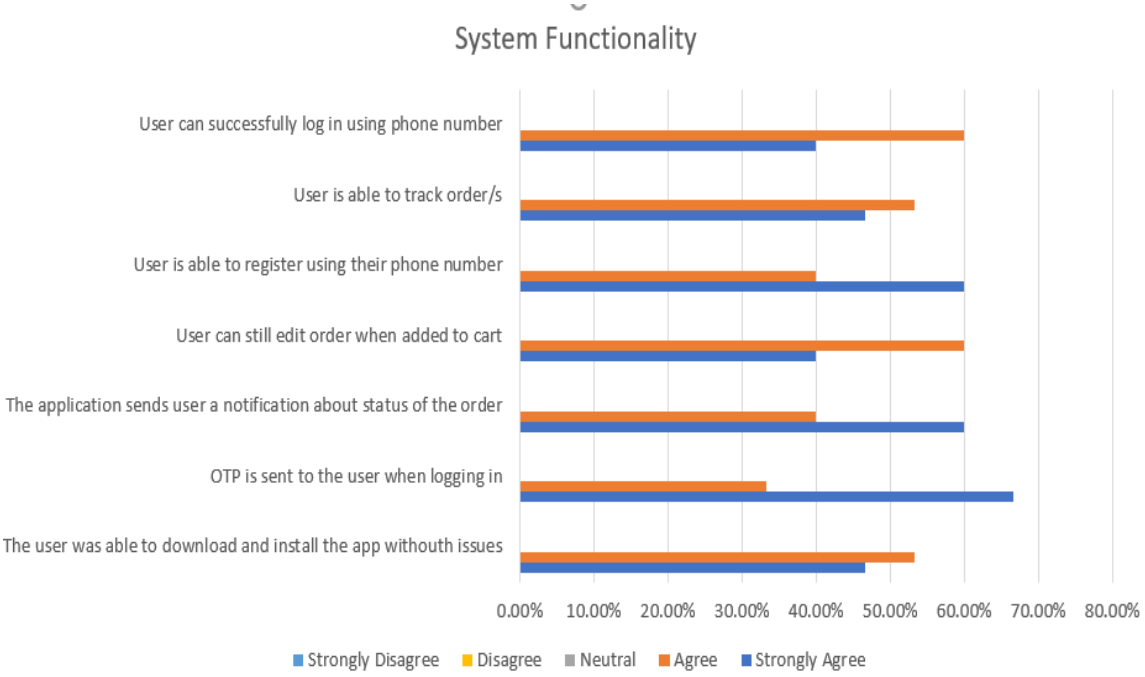

Figure 5. System Functionality

The first question asked is whether the user was able to install the app without issues. Eight respondents agreed and 7 respondents strongly agreed. The second question asked if a One Time Password (OTP) is sent to the user's phone number when logging in. The purpose of this process is to add an extra layer of authentication and to protect users against fraudulent login attempts. Five respondents agreed and Ten respondents strongly agreed. The third question asks if the application sends a notification to the user about the status of the order. It is important that the application send users a notification about status of order because so that they will be informed and be updated regarding the status of their pending orders. Six respondents agreed and nine respondents strongly agreed.

The fourth question asks if the user can still edit orders when added to cart. 60% of the respondents agreed and 40% of respondents strongly agreed. The fifth question asks if users can successfully log in using their phone numbers. This removes the mental load on the user to remember the email and passwords across various services. 40% of the respondents agreed and 60% of the respondent strongly agreed. The sixth question asks if users can track their orders. Tracking orders is very important for users. Consumers have no way of knowing when or whether their product will arrive at their door without tracking functionality. Ten respondents agreed and 5 respondents strongly agreed. The

seventh question asks if the user can successfully log in using their phone number. It is important that users can log in using their phone number because this serves as their log in key.

Interpreting the summary of the answers from respondents to the system functionalities, it is shown that users are satisfied with the features of the proposed system and that the functionalities are met. The result shows that rating of respondents got a lot of agree and strongly agree answers compared to neutral, disagree, and strongly disagree.

Getting feedback regarding the system's usability, as shown in figure 6, gathers the data needed to identify usability issues and improve the design of the application. The section "System Usability" contains questions pertaining to the system's user experience design.

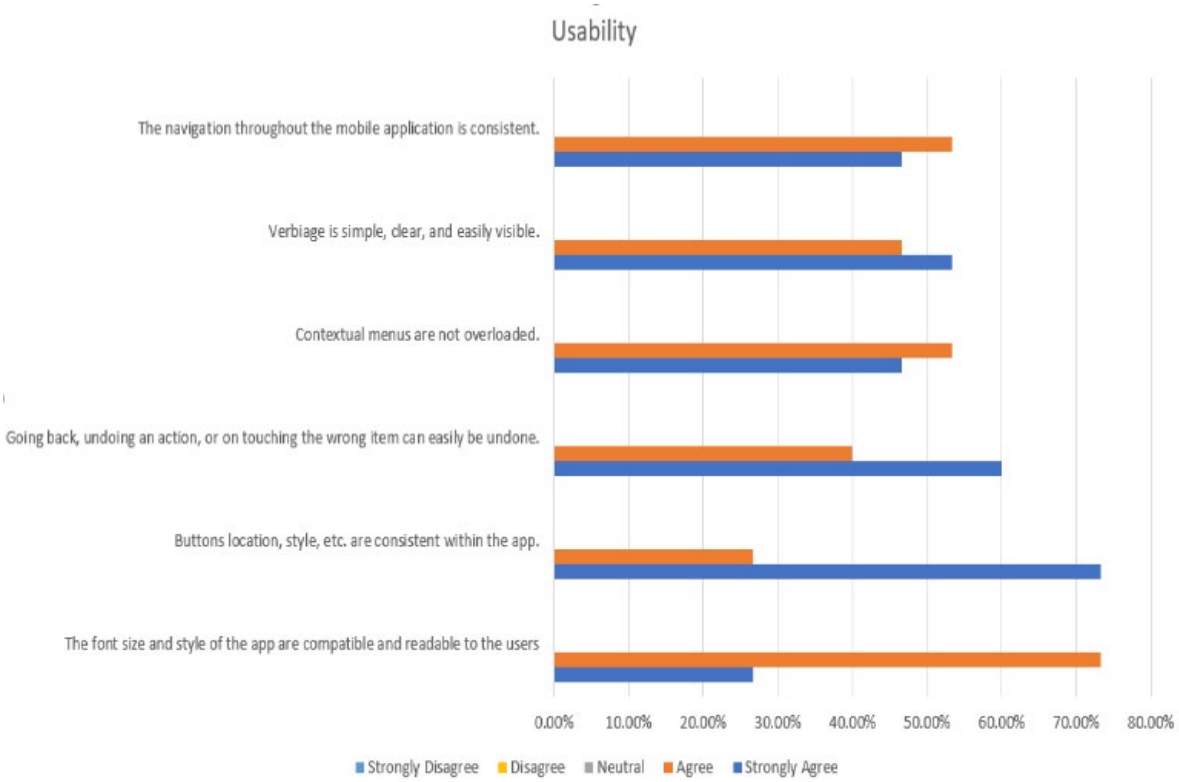

Figure 6. System Usability

Out of the six questions in the survey about the Usability of our application, we can see that the Buttons location, style, etc. are consistent within the app (5th question) 70% has the highest count of 'Strongly Agree' answer from our participants followed by the going back, undoing an action, or touching the wrong item can be undone easily (4th question) 60%. It shows that our participants are highly satisfied with our application because of the flexibility of the placements of the buttons and the navigation. They can easily tap each button without any hassle from their fingers. Also, it shows that users are satisfied with one of the features of our application which is the ability to undo their action. They can easily undo their unwanted actions while using our application.

6. Conclusion & Recommendation

Based on the UAT results, it can be concluded, the target users are satisfied with the functionalities and the design of the proposed system set in this study. The system provides the customer with the details they need to place an order. This system made for the local pharmacies or drug stores can help them receive orders and manage related transactions.

With the proposed medicines delivery system, the availability of medicines in a local drugstore is easily set up and the customers can easily place orders. Also with a medicine delivery system, tracking the orders is done easily, it maintains the database and improves the medicine delivery service. Having an online ordering and delivery system, potential customers can easily access it, view available medicines, send prescriptions easily, and place an order whenever it is convenient for them. As a result, the proposed solution includes feedback and wireless networking capabilities. The new scheme would draw shoppers while also improving the quality of the drugstore's operations. The scope of the new system is acceptable since it can be used by a wide variety of people who go to a drugstore or local pharmacy to purchase medicines.

The researchers recommend to future researchers to make the application available or can be accessed also by other local pharmacies. Having the application accessible by multiple pharmacies, it would give the customers more options to buy and select their preferred medicines. This option would solve the problem of having a limited variety of medicines that only one drugstore would have. The mobile application can search the inventory of other drugstores if one doesn't have the medicine that the customer is looking for. It would help maintain and retain customers in using the application since the mobile application will do the work for them to locate or find their medicines in multiple drugstores.

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