DESIGN AND DEVELOPMENT OF MOBILE APPLICATION FOR COMMUNITY PHARMACY IN TUY, BATANGAS

A Project Development Study Presented to
The Faculty of College of Industrial Technology
BATANGAS STATE UNIVERSITY
Balayan, Batangas

In Partial Fulfillment of the Requirements for the Degree of
Bachelor of Industrial Technology
Major in Computer Technology

By:
DIANNE L. BAUTISTA
HARLEE P. BELARMINO
ROSE ANNE L. GOMEZ
GEROME G. RAMEL

CHAPTER I

THE PROBLEM AND ITS BACKGROUND

This chapter presents the introduction, objectives of the study, scope, limitation and delimitation, significance of the study and definition of terms.

Introduction

Pharmacy is one of the most important stores that one community should have, it is a store that contains different types of medicine for medication. The role of pharmacy is to provide medicine that could help a person by providing the right and effective use of medicine if it is necessary, especially to those people who have doctor prescription that needs to take medicines regularly. No matter how big or small a pharmacy is, what is important is it can provide the right medicine for the customers. For the people in rural areas, they will have to go to town to look for pharmacies that offer medicines they are looking for. The reason why it is necessary to have a mobile application for community pharmacies is to reduce the consume time of the customer in finding a pharmacy that has the medicine needed. Because there are several pharmacies were the customers have to go in search for the said medication.

As time passed by, community pharmacy has improved from the traditional way of selling medicine that they are less strict in enforcing of having a prescription to buy medicine and now they are not selling medicine to the customer or patient without doctor's prescription on selected medicine to ensure the safety of

customers. Before, the community pharmacy was not very strict in selling drugs/medicines because the government has not yet ordered any restrictions on medicines that being sold at the pharmacy. And now, the prescriptions are required according to Matt Saks 2019 due to the reason that it was ordered by the government for ensuring the safety of the customers and it is the safest way of distributing the medicines. The community pharmacy has a pharmacist, who is in charged to talk to the customers, ensuring that the medicines prescribed by the doctor are suitable, and helping to decide which medicine they should take. According to the community pharmacy in Great Britain, in the 1930s the pharmacists usually spent so much time dealing and talking with the customer by giving some pieces of advice. It can distract the pharmacist and can cause out of focus on other tasks in the pharmacy. Customers are having difficulties when they are lined up in the front of the store, the customers should wait to buy medicine needed not knowing if it is available or not. And they cannot determine which drugs need a prescription and this can cause a waste of money for the customers who have hired service just to go to the pharmacy. It will affect customers because at this time, most important to every people is to save time. Sapitra Ega Rifgi, Akbar Saiful, and Arifiansyah Fitra 2019 develop a mobile application for finding, managing, and commercialize pharmacy. This pharmacy app focuses on helping people to easily find the nearest pharmacy available in their community. This application also provides Pharmacy a platform to commercialize their store and promoting their products. Public users can also manage their pill consumption intake by setting an alarm that will always remind them when to consume the

tablets. The application can set an alarm that will notify the user when they need to take their medicine.

However, there still have a problem such as the customers did not know if there is available medicine in a pharmacy. Most pharmacy app focus on promoting and commercializing their products. Another is when the user forgot to set alarm on when they need to take the medicine/drug and did not hear the alarm. Customers may have issues about what medicine needs a prescription that may affect the safety of the customer. This problem may cause hassle to the pharmacy at the same time to the customer.

At present, our world has evolved into modern technology, it became more advanced compared to previous years. Modern technology has made machines, gadgets, and many more inventions with technology. And one of the greatest inventions of modern technology is the “Mobile Application” where people can download and install it on a mobile phone or smartphone. A mobile application is flexible and it can use for different purposes and it plays a huge role in executing transactions or task, and it can be used at the pharmacy that has capabilities to reserve or to make a reservation of medicines, show the available medicines and to track where pharmacy has a medicine needed.

From the problems mentioned about community pharmacy, the researchers are challenged to have a reliable mobile application for community pharmacy. Researchers conducted a study about pharmacy app since they have been used yet in Tuy, Batangas. Researchers decided to create and think of an invention of a mobile application for the pharmacies in Tuy titled “Design and Development of

Mobile Application for Community Pharmacy in Tuy, Batangas" to have an effective, accessible, and reliable mobile app for pharmacy and people can able to reserve medicine. The modification of the existing mobile application becomes the goal of the researchers so, they have to design and develop mobile applications for community pharmacies.

Objectives of the Study

The main objective of the study is to design and develop a mobile application for community pharmacy.

Specifically, this study aims to:

1. Evaluate the existing Pharmacy Application
2. Design the Mobile Application for Community Pharmacy in terms of:
   2.1 Software Design
   2.2 User Interface
3. Determine the appropriate programming tool needed in developing the Mobile Application for Community Pharmacy in Tuy, Batangas
4. Develop Mobile Application for Community Pharmacy
5. Test and evaluate Mobile Application for Community Pharmacy in terms of:
   5.1 Accuracy
   5.2 Functionality

Scope, Limitation and Delimitation of the Study

The main focus of the study is the design and development of Mobile Application for Community Pharmacy. The study aims to help the customers to easily find the pharmacy that has medicine needed and to lessen the consumed time. The main focus of this study is to evaluate the existing pharmacy application based on their functionality, reliability, manageability, features and navigation. The study takes into consideration the planning and designing of the mobile application in terms of software design and user interface. Afterwards, the researchers will determine the appropriate programming tool needed in the development of mobile application. Lastly, the researchers will test and evaluate the developed mobile application in terms of accuracy and functionality.

The study limits on different pharmacies in Tuy, Batangas because there is no existing mobile application used in pharmacy. Functions are limited only in reserving the medicines, showing list of medicines and list of medicines that has prescription. Moreover, the study is limited only to android phone and it only runs as mobile application. To use the mobile application, it requires internet connection or data connection. The evaluation of the existing Pharmacy Application will be limited only in terms of operation like finding, managing and commercialize pharmacy. In terms of design, the Mobile Application for Community Pharmacy is only capable of in aspects such as Software Design and User Interface. The Pharmacy Application has the capability to reserve a medicine for two days, the

users can able to search medicine that indicates the price list and the number of available stocks of medicine.

This study is delimited to other pharmacy of different places and it has no delivery. Other transaction like online payment, inquire, communication between pharmacist and customers is excluded in this study. The system will not include the other products inside of actual pharmacy. Because it is way much better if we focus on the products that are related to medicines.

Significance of the Study

This study will be beneficial to the customers, community pharmacy, pharmacists, owner of the pharmacy, and future researcher.

For the Customers, it will benefit from the study because, it will help them to lessen the consumed time waiting in line to the pharmacy just to ask if the medicines that are needed are available or not. Customers can save time and effort every time they need to buy a medication.

For the Community Pharmacy, it will be beneficial from the study as it will help the pharmacy to make the process or transaction more efficient whenever someone buying a medicine. Also, it will help to avoid overcrowded inline or inside the pharmacy.

For the Pharmacists, it will benefit from this study for the reason that, this will help them to make the tasks more manageable and easier. They can easily monitor the records of the medicines using the mobile app.

For the Owner of the Pharmacy, it will benefit from the study because in today's modern technology a lot of people used smartphones and installed a reliable mobile application. The study will help them gain more customers and recognize their store that could probably help increase their sales.

For the Future Researchers, it will benefit from the study because the study will serve as a reference and will provide a baseline for the students who are going to conduct research that is related to this study. The study can be used as a guide for creating their research paper.

Definition of Terms

The following terms are define conceptually and others are operationally according to how it will be used in the study.

Drugs. Drugs are chemical substances that can change how your body and mind work. They include prescription medicines, over-the-counter medicines, alcohol, tobacco, and illegal drugs (MedlinePlus 2020).

Internet Connection. An electronic communications network that connects computer networks and organizational computer facilities around the world (Merriam Webster). In this study, this is one of the requirements needed to use the mobile application.

Invention. The act of bringing ideas or objects together in a novel way to create something that did not exist before (James Burke 2010).

Medication. Medicine can treat diseases and improve your health (MedlinePlus 2020).

Mobile Application. A mobile application, most commonly referred to as an app, is a type of application software designed to run on a mobile device, such as a smart phone or tablet computer and frequently serve to provide users with similar services to those accessed on PCs (Techopedia 2020).

Prescription. The instruction written by a medical practitioner that authorize s a patient to be provided a medicine or treatment (Merriam Webster) Operationally, this refers on knowing what medicine has a prescription.

Reservation. A reservation level of benefit payments exists in this dynamic decision problem at which an individual is indifferent between accepting and refusing an offer (Federal Reserve Bank of San Francisco, 2020). In this study, it will be one of the main feature of the mobile application that the customer can use.

Restriction. The limiting condition or measure, especially a legal one (Merriam Webster)

Technology. Technology may be defined as the application of organized knowledge to practical tasks by ordered systems of people and machines (Technology Liberation Front 2014). In this study, technology will be using to build a mobile application

Transaction. It is an act in which one party gives one right in exchange for another (He, 2010). In this study, it describes how users will transact using the application.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter includes the conceptual literature, research literature, synthesis, conceptual framework and conceptual paradigm.

Conceptual Literature

To further support the idea of the researchers, reading of related concepts were done. This may serve as a guide for developing the project.

Pharmacy

According to Encyclopedia Britannica (2017), the science and craftsmanship concerned with the arrangement and standardization of drugs. Its scope incorporates the development of plants that are utilized as drugs, the blend of chemical compounds of restorative esteem, and the investigation of restorative specialists. Drug specialists are capable for the planning of the dose shapes of drugs, such as tablets, capsules, and sterile arrangements for infusion. They compound physicians', dentists', and veterinarians' medicines for drugs. The science that grasps information of drugs with extraordinary reference to the component of their activity within the treatment of infection is pharmacology.

In addition, Pharmacy is the health profession that links the health sciences with the chemical sciences. It is charged with ensuring the safe and effective use of pharmaceutical drugs. Pharmacists are the experts on drug therapy and are the

primary health professionals. In the U.S. and Canada, drug stores sell not only medicines, but also miscellaneous items such as candy, cosmetics, and magazines.

Community Pharmacy

According to Smith & Pharm (2019), Moreover known as retail drug store, is the foremost common sort of drug store that permits the open get to their solutions and counsel around their wellbeing. Customarily known as a chemist, it is the healthcare office that's capable for the arrangement of pharmaceutical benefit to a particular community bunch or region. Most community drug stores have a commercial store with a combination of restorative products as it was accessible with a medicine and those with that can be acquired over-the-counter.

According to The Internet Pharmacy Market (2016), with the modern technology purchasing products online become a new way. Several patient safety risks are linked to the purchase of medicines outside the traditional supply chain. Thousands of internet pharmacies are accessible on the web; the actual size of the market is unknown. This study aims to gather information on the frequency and attitudes of patients purchasing medications online.

In addition to that, the community pharmacy is the most strategic health establishment where patients can get access to care and get directions to navigate our health system. “Pharmacists can lighten the burden caused by COVID-19 to our patients as well as health system”. (Philippine Pharmacists Association, Inc. [PPhA], 2020)

Community Pharmacists

According to Smith & Pharm (2019), community pharmacist are considered to be the most accessible health professional to the public, as they are available to provide personalized advice about health and medicine on a walk-in basis, without the need for an appointment. 89% of the population in the United Kingdom can access a community pharmacy within a 20-minute walk.

Mobile Application

According to Technopedia (2017), mobile application it is the most commonly referred as an app, it could be a sort of application program planned to run on a versatile gadget, such as a smart phone or tablet computer. Mobile applications habitually serve to supply clients with comparable administrations to those gotten to on PCs". In 2017, portable applications are a basic portion of our life. We utilize them to chat with companions, pay charges, arrange pizza, take photographs of cats, and parts of other stuff. According to measurements, we're investing more time with our smart phones than before PCs. So nowadays, we'll consider the history of versatile applications, attempting to get it how they got to be the center of our consideration in such a brief period of time.

According to Flick & Morehouse in Securing the Smart Grid (2011), most cases mobile applications are developed to be an interface to the standard application. The security controls will remain the same.

According to Mroczkowska (2020) mobile application is a kind of system that design to run in a mobile device. And it has limitation base on the target

function of its systems. And even the mobile devices are becoming more advance. The mobile app can adapt and can be more functional with the device.

According to Wigmore (2013) mobile application is developed for a small computing device. Mobile app is design base on their capabilities that they need to do. And mobile apps can be developed in a specific platform that is compatible to the system and it can be flexible as the mobile devices are being upgrade.

Mobile App Development Process

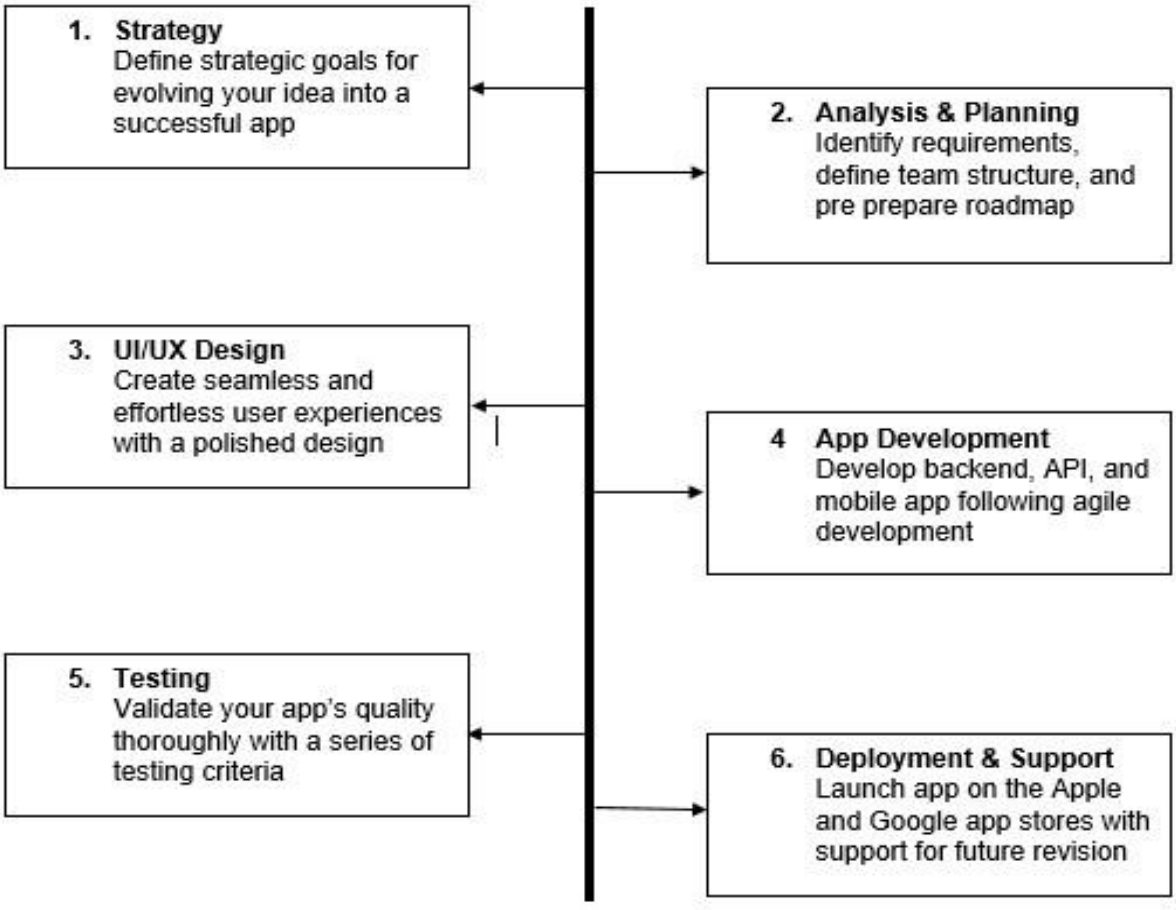


Figure 1. **Mobile App Development Process**

1. Strategy

Strategy is the first phase when developing a mobile app, to determine the strategy that can used to have a successful application.

In this phase you will:

- Identify the app users
- Research the competition
- Establish the app's goals and objectives
- Select a mobile platform for your app

2. Analysis and Planning

   This stage the mobile app idea starts to figure out and the project turns into actual. The analysis and planning begin by identifying use case and comprehensive functional specifications are captured. After identifying the requirements needed in developing the app, it needs to prepare roadmap. In this planning phase this entails prioritizing the criteria for the mobile application and grouping them into targets for delivery. And also required the skills for the initiative to develop mobile app.

3. UI/UX Design

   The purpose of mobile application design is to provide a polished look with effortless user experiences. A mobile application success is to determine on the basis of how well users adopt and benefit from all its features. The aim of the UI/UX mobile app design is to create outstanding user interfaces that make the app dependent and user-friendly.

4. App Development

   In the mobile app development process, planning remains the important part of this phase. Before the development process you must have to;

- Defining the technological framework
- Pick a technology stack and
- Define the milestones in progress

5. Testing

   During the mobile app development process, conducting Quality Assurance (QA) testing makes applications stable, usable and safe. First is you need to plan test cases that cover all aspects of software testing to ensure extensive QA testing of mobile application.

6. Deployment and Support

   Deployment and Support requires submitting the app to the app stores, to the app store for IOS and google play for android apps. But the developer need an account to launch the app on different app stores before launching the mobile app.

Pharmacy Management System Data Flow Diagram

According to Namita (2017) Pharmacy Management System Data Flow Diagram is a preliminary step to create the design and flow of the system. And it contains all the process and data such as Medicines, Company, Stocks, Sells, Inventory, and Login. It is the visualization of the target output of a pharmacy system. And it has admin that have access to all the data inside the system.

Zero level Data Flow Diagram (0 Level DFD) of Pharmacy Management System Zero level Data Flow Diagram (0 Level DFD) of Pharmacy Management System is the elaboration of process of the Pharmacy. It is designed to be the view of Sells,

Inventory and Login, showing the system including the Pharmacy, Medicines and Stocks.

High-Level Entities and process flow of Pharmacy Management System:

- Managing all the Pharmacy
- Managing all the Medicines
- Managing all the Stocks
- Managing all the Company
- Managing all the Sells
- Managing all the Inventory
- Managing all the Login

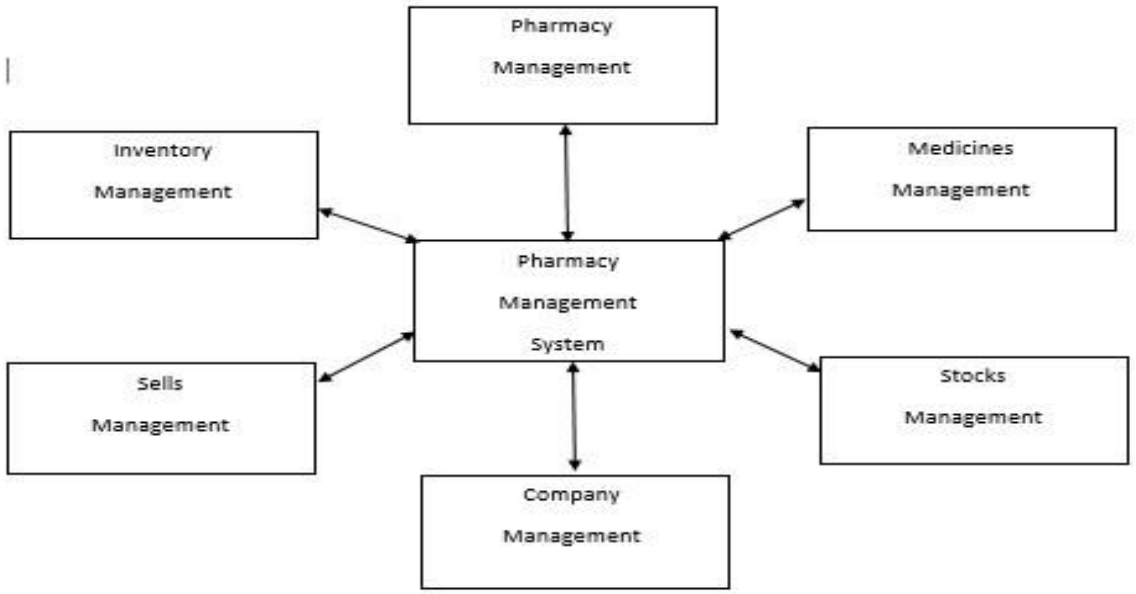


Figure 2. Zero Level DFD – Pharmacy Management System

First Level Data Flow Diagram (1st Level DFD) of Pharmacy Management System

This is the Pharmacy Management System shows the system divided in to sub-system or processes. It provides all the functions of Pharmacy Management

System, it also contains the internal data of Login, Inventory, Sells, Company, Stock that must be present in order to Pharmacy Management System to do its job, and it shows the data flow between various parts of Pharmacy, Stocks, Inventory Login, Sells of the system.

Main entities and output of First Level DFD (1st Level DFD):

- Processing Pharmacy records and generate report of all Pharmacy
- Processing Medicines records and generate report of all Medicines
- Processing Stocks records and generate report of all Stocks
- Processing Company records and generate report of all Company
- Processing Sells records and generate report of all sells
- Processing Inventory records and generate report of all inventory Processing Login records and generate report of all Login

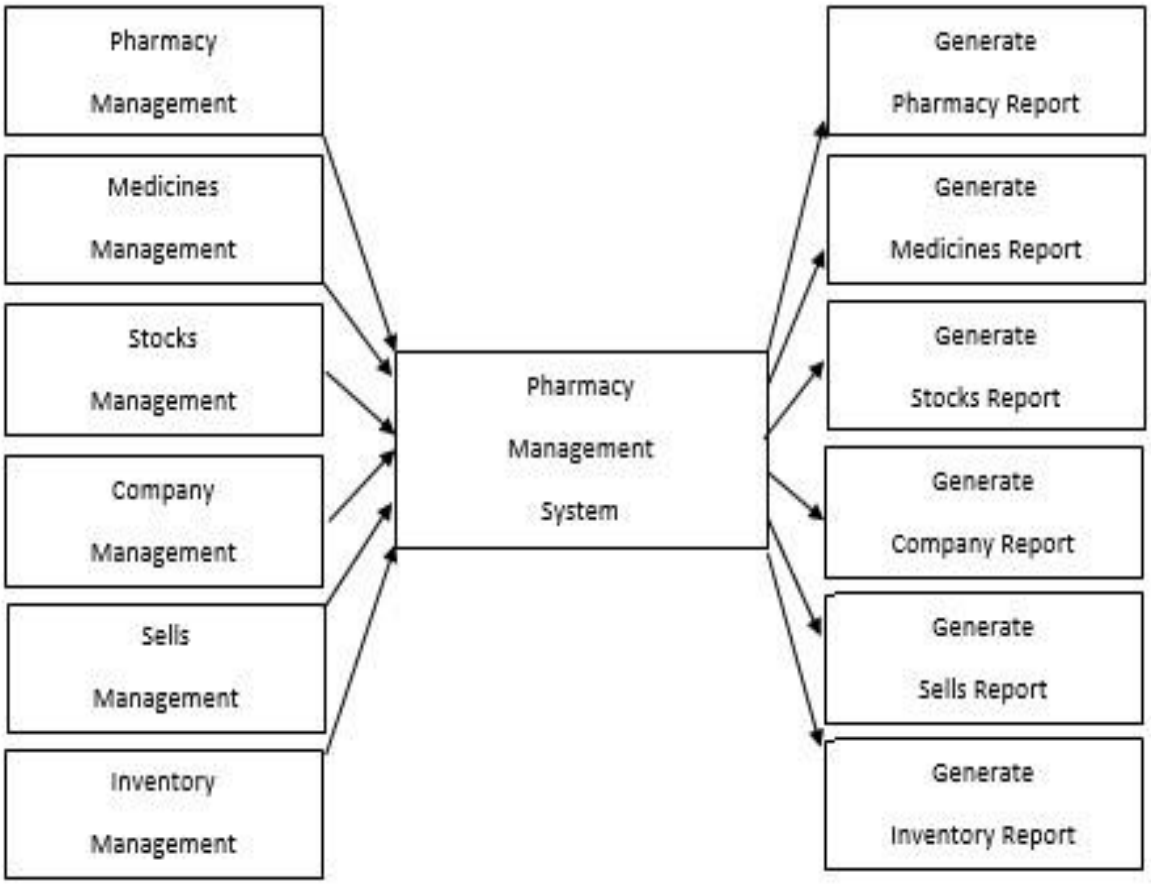


Figure 3. First Level DFD – Pharmacy Management System

Second Level Data Flow Diagram (2nd Level DFD) of Pharmacy Management System:

It shows the require functionalities of Pharmacy functioning. The first level (1st level) of Pharmacy Management System shows the system that divided into sub-systems or processes and the 2nd level of Data Flow Diagram includes the Login, Inventory, Sells, Company, Stocks, Medicines and Pharmacy.

Low level functionalities of Pharmacy Management System

- Admin logins to the system and manage all the functionalities of Pharmacy Management System.
- Admin can add, edit, delete and view the records of Pharmacy, Stocks, Sells, Login
- Admin can manage all the details of Medicines, Company, Inventory
- Admin can also generate reports of Pharmacy, Medicines, Stocks, Company, Seles, Inventory
- Admin can search the details of Medicines, Sells, Inventory
- Admin can apply different level of filters on report of Pharmacy, Company, Sells
- Admin can tracks the detailed information of Medicines, Stocks, Company, Sells

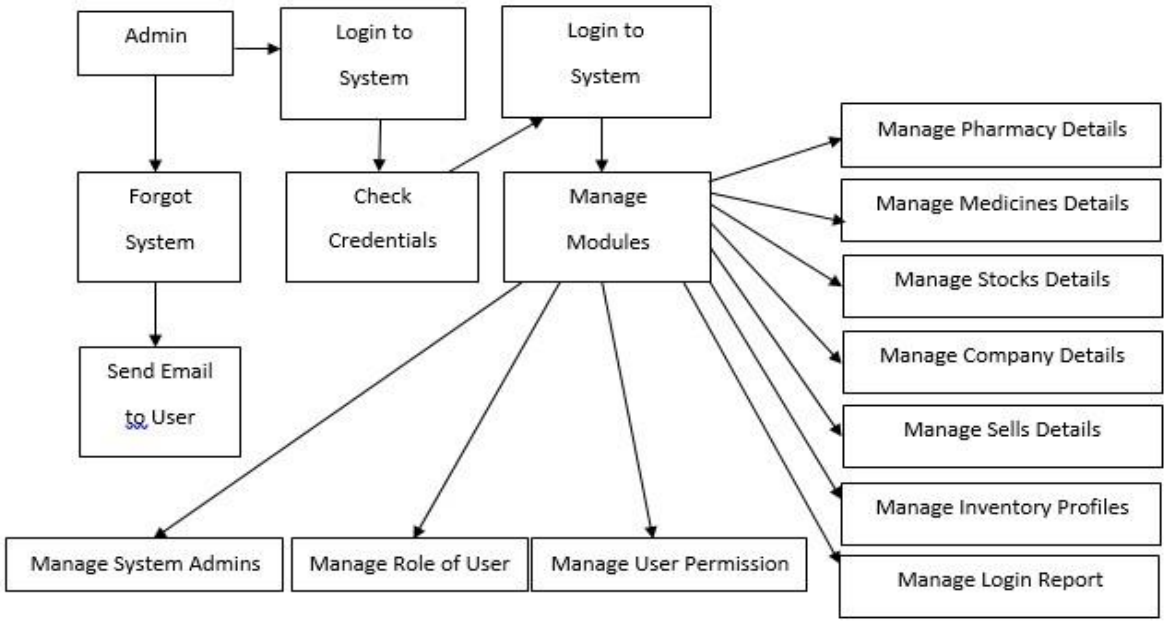


Figure 4. Second Level DFD – Pharmacy Management System

Java. According to Friensen (2019) Java is an object-oriented programming language. He said that in the tutorial of java have fundamentals like having nonobject-oriented features and syntax that will be explain during the tutorial of the programming language. And also tackles on how to use comments, identifier, types, literals and variables on Java programming.

Research Literature

This part shows the existing studies which the researchers consider related to the research work and believe that will serve as a guide for developing the study.

According to the study of Rifgi, Saiful and Arifiansyah Fitra (2017) entitled "The MedMaps apps: Mobile application for Finding, Managing and Commercialize Pharmacy", the Mobile Application for Finding, Managing and Commercialize Pharmacy is generated from the idea of this MedMaps. The scope of this research is to develop a mobile for application to help people looking for medicine to the nearest pharmacy. This application also provides Pharmacy a platform to commercialize their store and promoting their products. Public users can also manage their pill consumption intake by setting an alarm that will always remind them when to consume the tablets. The development of this application has going through all required phases based on the Rational Unified Process (RUP) software methodology. The analysis had been done and requirements are being documented properly to ensure the efficiency of the end product. The literature review on existing system and technology are also important.

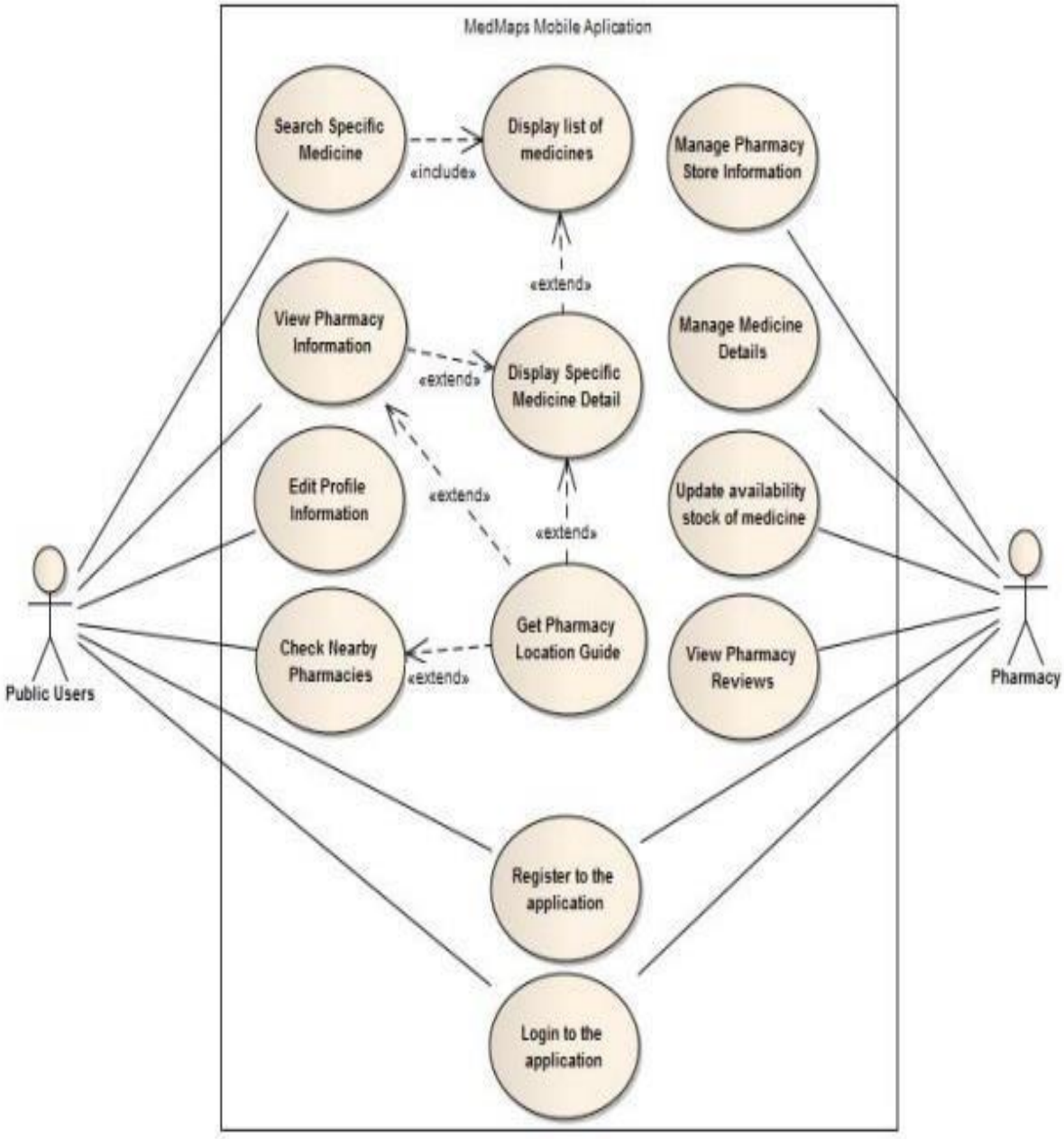


Figure 5. MedMaps Mobile Application Use Case Model

The study of Malhorta (2016) entitled “MedTrack: A Mobile Application for Patients, Physicians and Pharmacies; Track Your Med-Health on the go” is a mobile application that patients use to track their medicines. In this application the

patients can scan their medicine to know the dosage of the medicine they are going to take. This can help in every patient because this application try to solve a key challenge in patient healthcare. Health care services is important for promoting and maintaining health, preventing and managing disease, reducing unnecessary disability and premature death, and achieving health equity for all. In this Mobile Application users can register themselves on the app and to keep track their medication. By using this application can help patient's tract their medicines intake and by using android mobile devices application can send real time notification to the patients and they can allow patients to order prescription refills.

The study of Thinnukool, Khuwuthyakorn and Wentong (2017) entitled "Pharmacy Assistant Mobile Application (PAMA)" shows that nowadays mobile applications are widely used, people can access their real needs especially medication using mobile applications. Users can access information by searching to the Internet rather than consulting to the doctors, pharmacists or experts. This study aims to develop mobile application that is required functionalities and features that designed on the iOS operation system. This mobile application has been tested and the result of experimental review, which they found out an issue that needs to be considered on developing a mobile application of healthcare for the customers and patients.

It was stated from the conference paper of Huang and Pou-Jen (2019) entitled "Intelligent Technology Enhances the Friendliness of the Pharmacy Care Service", that in Taiwan the patient or customer gets their medicine on their own, they must bring their own prescription of medicine and inquire the drug specialist

to adjust. The drug specialist has the obligation to assess the monotony of the medicine, and they communicate with the doctor in arrange to help the persistent to have the optimization of the pharmacy service and the care asset integration. In any case, within the usage whereas the drug specialist performs wellbeing pharmacy care, it isn't simple to record the medicine data of the persistent, primarily since the drug store data substance of the drug store care is exceptionally complicated. Subsequently, this study will be utilize AI optical identification and AI learning methods to recognize the details of medicines prescription and drug data and to set up an optical identification of expert system and a drug store care database to permit drug specialists to perform pharmacy care administrations. This study cooperates with the Taiwan Pharmacists Association, Their plan has to deepened technology of artificial intelligence into the field of pharmacy care.

According to the study of MacKellar and Leibfried (2018) entitled “Designing and building mobile pharmacy apps in a healthcare IT course”, one of the important skill of IT student is to collaborate domain specialists while designing IT solutions. The IT students target is to know the steps in the scenario to know how they design the mobile app. And base on the scenarios, they will know the flow of the system and they will develop a mobile app that will be useful for creating a system for healthcare apps. IT student also collaborated with the pharmacy student with the task analysis which aimed to identifying pharmacy scenario.

Based on the study of Jacob, Palanisamy and Chong (2019) entitled “A qualitative study on the design and development of a mHealth app to facilitate communication with the Deaf community: perspective of community pharmacists”,

the purpose of the study is to prepare groundwork on the potential design and development of a mobile health (mHealth) app. The focus of the group was the 12 community pharmacists where they need to gather data that will put in the app. They discuss on what are the things need to be consider on building the app specially to know what design does the community pharmacists wanted. And there were also feedback on the contents and design of the app which could help them to provide better output for their study.

According to Choi et al. (2016) College of Pharmacy, Mercer University, United States entitled "Mobile Applications to Improve Medication Adherence: Existing Apps, Quality of Life and Future Direction", the advantage and disadvantage of current mobile application. According to the articles and reports that they reviewed, hundreds of medicine on applications is shown on the market. The result of the findings, were revealed that the application are helpful to the patient. The function of the application are included the manual reminder alerts and it can access the drugs information. The mobile application targets populations of patients, caregiver, elderly, low income individuals and other patients. This mobile application have beneficial impact patients, caregivers, healthcare providers and pharmacists. The researchers have concern about using the mobile application, because of the privacy issues. And to the future researchers we will may improve the features in mobile application use in healthcare.

According to the conference paper of Kubra et al. (2017) entitled “Mobile Application for checking the status of stock availability in Pharmacy”, the mobile application are becoming more popular and useful to the medical field way back

2015. Over 500 million user of a smart phone were using a mobile application and it can used for buying medicines online. The aimed of this conference paper was to develop a pharmacy app were android platform is used. The android application they implemented for pharmacy has the ability to locate pharmacy from any place, it will be helpful for the customer and patients who was needed to take medicine. It will also help to lessen the human efforts, lessen time taken without walking through every pharmacy. The pharmacy application that they build, set up as an online communication with the admin and the client or customers.

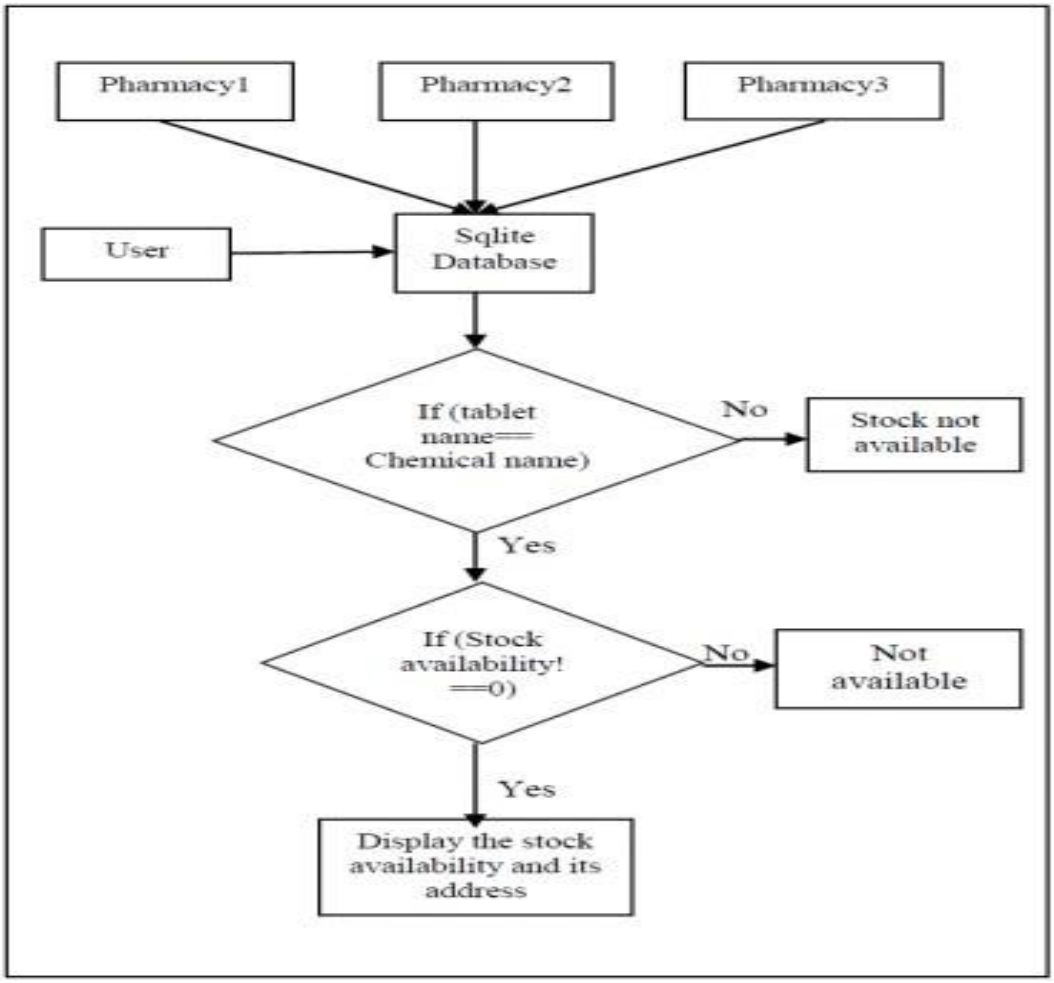


Figure 6. Framework for Checking the Status for Stocks Availability in a Pharmacy

The study of Sheikh and Islam (2016) entitled “A qualitative study of major programming languages to computer science students” stated that programming is a fundamental course that is taught to every computer science during their initial semesters. Also they said that the course introduces the students to basic operations and architecture of computers. The study said that there is a fundamental tool that need for the students to understand on they analyze and study the concepts of the computer science. The selection of programming language for teaching to computer science students is extremely important. They also said that selecting programming language is very important for computer science students. They mentioned different programming languages like C++, C#, Java, Pascal, GWBasic, and JavaScript. The objective of the study is to determine the programming language should be taught to computer science students at introductory level.

Synthesis

After reviewing some theses, the researchers found out that these studies have similarities and differences to the propose study. The information that the researchers gathered that can help to easily know the ideas and thoughts that connected to the study. The conceptual literatures included by the researchers to have backgrounds and basis about present study to be able to create the project.

The Encyclopedia Britannica, discussed about the pharmacy with the arrangement of standardization of drugs. It stated that drug specialist of pharmacist capable for guiding and helping the customers when buying medicine. Pharmacists

are the expert on medicine, they were in charge with ensuring the safe and effective use of drugs or medicine. Smith and Pharm discussed that the community pharmacy is a retail drug store, that sort of drug store that permits to get the solution and counsel of well-being. The Internet Pharmacy discussed that with the used of modern technology, buying products online become a new way in today's generation. They stated that community pharmacy is the most strategic health establishment where patients can get access and get directions to navigate health system. Technopedia and Mroczkowska discussed the mobile application that it could be a sort of application program planned to be able to run on gadgets such as smartphone or tablet. Moreover, Wigmore discussed the Mobile Application Development Process that includes the strategy to identify the app users, research the competition, establish the app's goals and objectives and select a mobile platform for the application. Next is Analysis and Planning, UI/UX Design, App Development, testing and lastly deployment and support. This will help the researchers to know the process in developing a mobile application. Namita discussed the different aspects need in Pharmacy management system Data Flow Diagram. It will also help the researchers to understand on what possible functions needed in developing the Pharmacy Application.

The study of Rifgi, Saiful and Fitra (2019) is similar to the present study in terms of target beneficiaries which is the people or customer of a particular community pharmacy. Both studies have the same features that can determine the nearest pharmacy with has the available medicines that customers are looking for. On the other hand, the present and previous study differs in the content of the

design and function of the system. The previous study has the functionality that users can set alarm on what particular time they need to take medicine while the present study, one of its functionality is to reserve a medicine and to determine the medicines that requires a doctor's prescription.

The study of Malhorta (2016) and the present study are similar since both studies focuses on developing a mobile application for pharmacy. Also both studies have similar target which is the customer or patient who needs medicine and has regular medication. However, both study differs in the process of their application. The previous study focuses on the application that can send real time notification for the patients to take medicine while the present study focuses on helping customers to find a community pharmacy that has the available medicines they needed to buy.

The study of Thinnukool, Khuwuthyakorn and Wentong (2017), is somewhat similar to the present study since both studies want to convey to people the importance of the Mobile Application especially in the matter of medication and both studies are the same beneficiary and these are the patients who need medicine. The two studies are dissimilar because the previous study focuses on developing a mobile application for iOS operating system while the present study will be focusing on developing a mobile application for android operating system.

The study of Huang and Pou-Jen (2019) is similar to the present study because, they both say that the community pharmacist or drug specialist has an obligation and they are responsible to guide the customer when it comes on buying medicine. And also they are similar in terms of function which is the AI (Artificial

Intelligence) that can search and recognize the medicines. But the present and previous study are difference in terms of the plan because, the previous study has plan to deepened technology of artificial intelligence into the field of pharmacy care. While the present study has plan to do a mobile application that has capability to track a community pharmacy who have available medicines needed in medication.

The study of Mackellar and Leibfried (2020) is similar to the present study in terms of gathering the data for the design of mobile application for community pharmacy and the researchers on both studies needs to collaborate to an IT specialist while designing the app. And they are also similar with the basis on making the app and why they come up with this study, they determine the scenario of the problem on community pharmacy to know what will be the possible flow of the system that can develop a mobile app that we will be useful. However, both studies are dissimilar because, the previous study collaborated with pharmacy students while the present study will collaborate with the IT instructor, adviser and IT specialist.

The study of Jacob, Palanisamy and Chong (2019) the present and previous study are similar with the target beneficiaries which is community pharmacists that also one of the target beneficiaries of the present study. Both studies are dissimilar, the previous study is focusing on the 12 community pharmacists where they need to gather data that they will be needed to put in their mobile app (mHealth). While the present study is focusing on gathering data from the pharmacies on one specific place which is Tuy, Batangas.

The study of Choi et al. (2016) is somewhat similar to our study in terms of the targets population such as patients, elderly and other patients. But the previous and present study are dissimilar in terms of the function of mobile application, the previous study focuses on the function of manual reminder alerts and access of drugs information while the present study will be focusing on determining the available medicines in the pharmacy around Tuy, Batangas.

The conference paper of Kubra et al. (2017) and the present study is similar to the present study due to the reason that both studies are focusing on developing a mobile application for pharmacy that can track the status of stock available medicine in pharmacy. They are similar in terms of scope which is the customers and patients, both study aims to help to lessen the consume time, to lessen the human effort by walking through every pharmacy just to check if the medicine needed is in there. Therefore, they are different in some ways because the past study has the capability to track or locate pharmacy from any place while the present study will be focusing on one specific place which is Tuy, Batangas.

The study of Sheikh and Islam (2016) is similar to the present study because both studies are focusing on what programming language needs to use to build a mobile application. The appropriate programming language is one of the most important in developing a mobile app for community pharmacy. The difference between both studies is the purpose of their project, because the previous study wants to share information about what are the major programming language use in computer science students. While the purpose of present study is to develop a mobile app using the programming language.

Conceptual Framework

The whole endeavor of the propose project is reflected in this section.

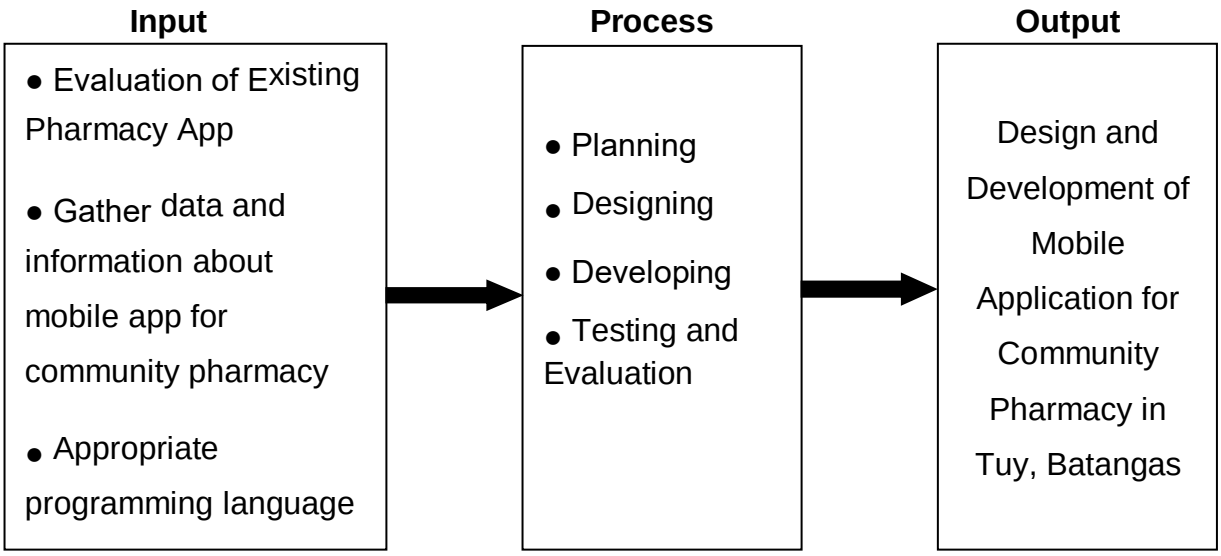


Figure 7 Conceptual Paradigm of the Study

The first stage shows the inputs in making the project which includes the evaluation of existing studies about pharmacy application. It also includes the data and information gathered from community pharmacy, pharmacy app and the ideas and concept of the researchers as well as the adviser. In this stage, it will also include the selection of appropriate programming language that the researchers can use in creating a mobile application. These are the inputs that can be the basis on how the researchers can build the project or output.

The second stage is the process which contains planning that serve as the preparation for the researcher's project. It includes designing, creating layout of mobile application and putting all the desire content of the design. Developing of the mobile application for community pharmacy is based on the scope of the study

and the functions/transaction that the mobile app can perform. Testing and evaluating are the methods needed to ensure and check if the project is responsive and running smoothly.

After the input and process stages, researchers will advance to third and final stage which is the output. In this stage, the development of the mobile application for community pharmacy will be made possible.

CHAPTER III

DEVELOPMENT METHOD AND PROCEDURE

This chapter presents the discussion of method and procedures in developing this project.

Evaluation of the Existing Pharmacy Application

Before the development of mobile application for community pharmacy, the researchers should search for the existing pharmacy application and they need to know the common function between existing Pharmacy application. The researchers will check the flow of the existing system to know how the system work. With the evaluation of the existing application, the researchers determine what are the possible flow and function that needed to improve in the development of pharmacy application. The researchers had an idea on how to design a mobile application for community pharmacy. It is important to evaluate the existing pharmacy system to know what features of existing pharmacy do not have.

Designing Stage

In this stage, the researchers will design the project by studying and analyzing what should be included in designing the mobile application. After studying and analyzing, the researchers start to visualize what could possibly be included in designing the pharmacy application. Researchers will begin by creating

the design and also they should create a flow chart to easily explain the function on how the pharmacy app will work. The design of existing pharmacy app can be use by the researchers as basis to create their own design. In designing stage, researchers need to choose an appropriate software to design a pharmacy application that can run smoothly. And lastly, the researchers will find a tool or application that can be use on creating a flow chart of the proposed system.

Tool Selection Stage

Next is selecting the tools, researchers need to find the appropriate programming tool that we can use for developing a mobile application. The researchers need to look some programming languages that can fit for the development of mobile application. In order to know what are the exact tool and requirements needed, the researchers need to search on the internet for what possible program that we will include for making this project. The researchers ask some instructor of computer subject as well as the adviser for some information on how the project will be possible to make the mobile application for community pharmacy. Researchers will consider all the information gathered from the internet and instructors to be able to choose the right tool and requirements to make the project successful. The researchers need to choose the best tool to make sure that the mobile application can build and has no problem.

Development Stage

After selecting the appropriate programming tools needed, researchers can use all the gathered information from the internet, instructor's advices and most importantly the suggestions from the pharmacists on what content of mobile application should have like list of medicines, medicine that needs doctor prescription, number of available medicine from different pharmacies. To make the project enable, it will consider the desired output of the users and community pharmacy. And they should consider the software components for the researchers to be guided on what are the compatible software when developing the mobile application. After determining the desire output, the researcher should install the chosen application for developing the mobile application. And the researchers can create the whole app including the design and database. The mobile application will be develop base on the design and flowchart that constructed by the researchers, this will be the key to develop a successful mobile application.

Testing and Evaluation Stage

In this stage, testing and evaluation of the mobile application is conducted. The researchers will provide the assessment of the developed mobile application, the process is done to make sure the effectiveness of the system and to check if all of the plans and the target design are use in the project. Also they need to check the functions of the system to make sure that the mobile app is responsive and working properly. The researchers should consult professionals to know their

opinions and suggestions about the performance of the system. The mobile application needs to undergo repeatability tests to make sure that the application is responsive. This method will test the application if it is consistent on doing its job and for checking if there is a problem on the flow of the mobile application. The developed mobile application will be check by the researcher's base on the target output and the included contents of the project. And the capabilities of the project were observe to know what are the errors and bugs that is needed to fix.

Time Allotment

The chart shows the time commitment for every stage of the development of the project.

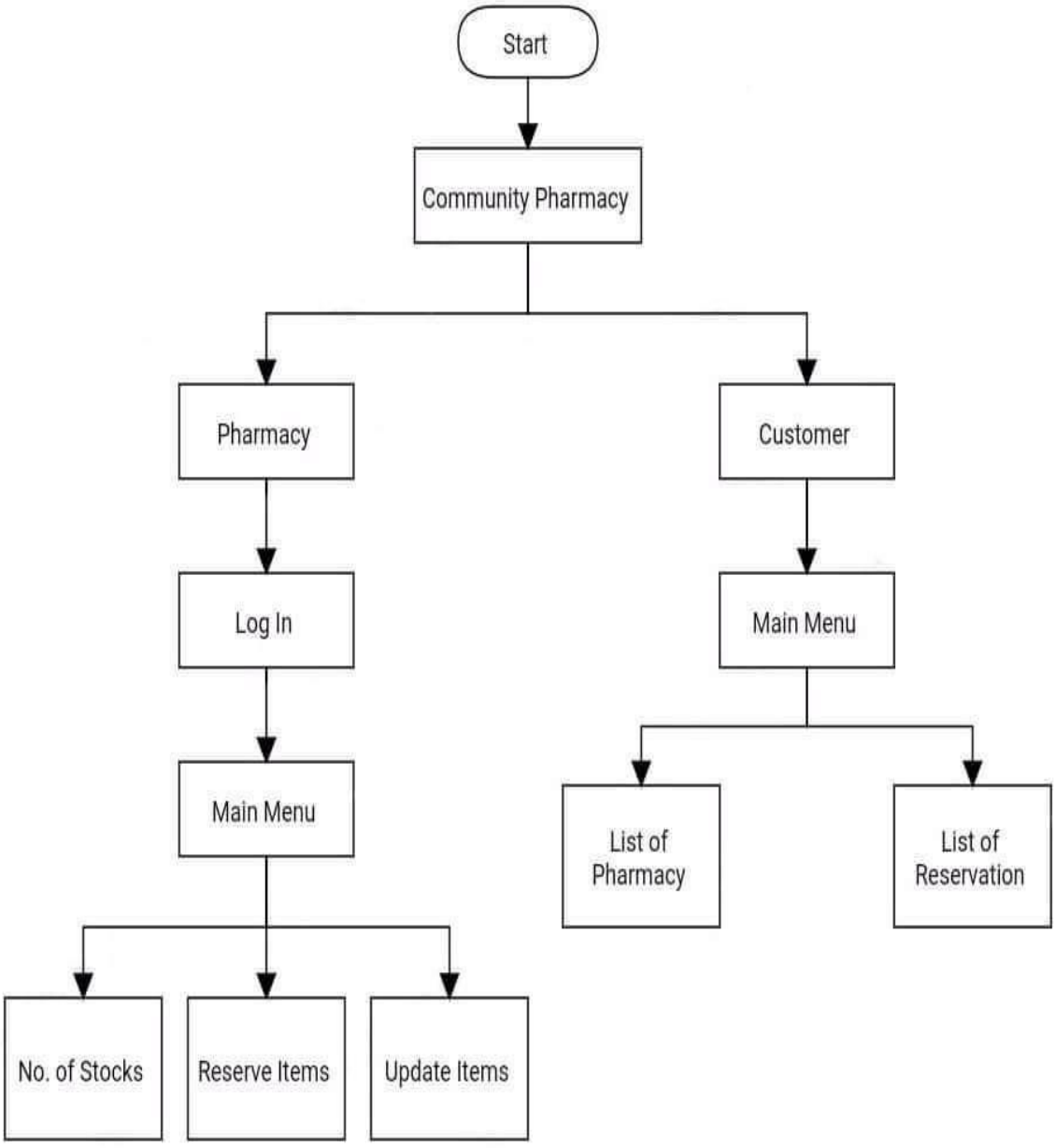
Procedures	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Evaluation of Existing Pharmacy Application							
Planning							
Designing							
Development							

Testing and Evaluation							

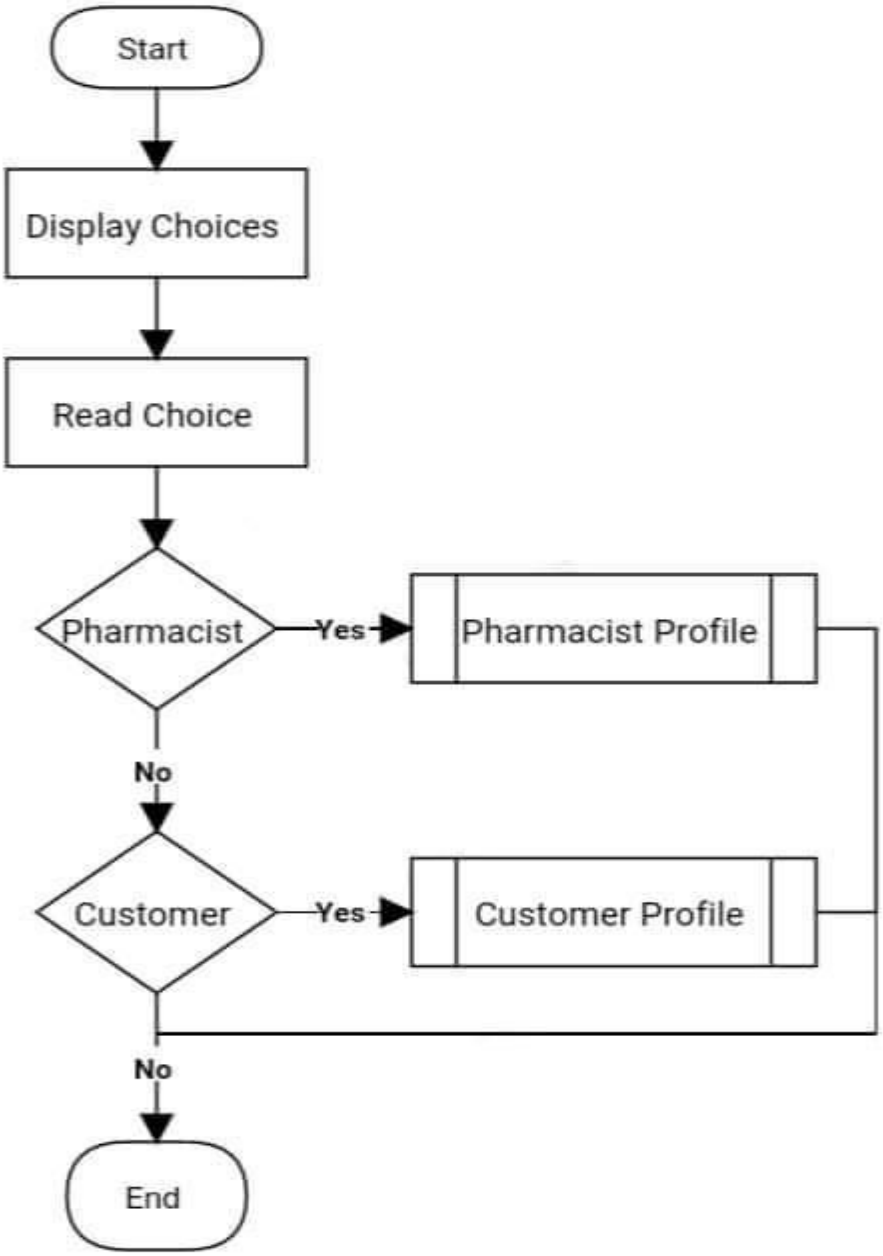
Table 1. Gantt Chart

The researchers started to search and plan on what project that can be good for the study. In the month of August, researchers started to evaluate the existing Pharmacy Application. The researchers start to look for what problems that needed to have a solution. In the month of September and October, the researchers start to plan how they create the mobile application, and they gather data about existing Pharmacy app. In the month of November, the researchers able to gathered more information and conduct an interview on community pharmacies and ask some questions if will be okay to gather data from their pharmacy. The researchers also asked permission to the owner of the pharmacies to gather information about the data of pharmacy that can retrieved and if they allow the researchers to make a mobile application for their pharmacy.

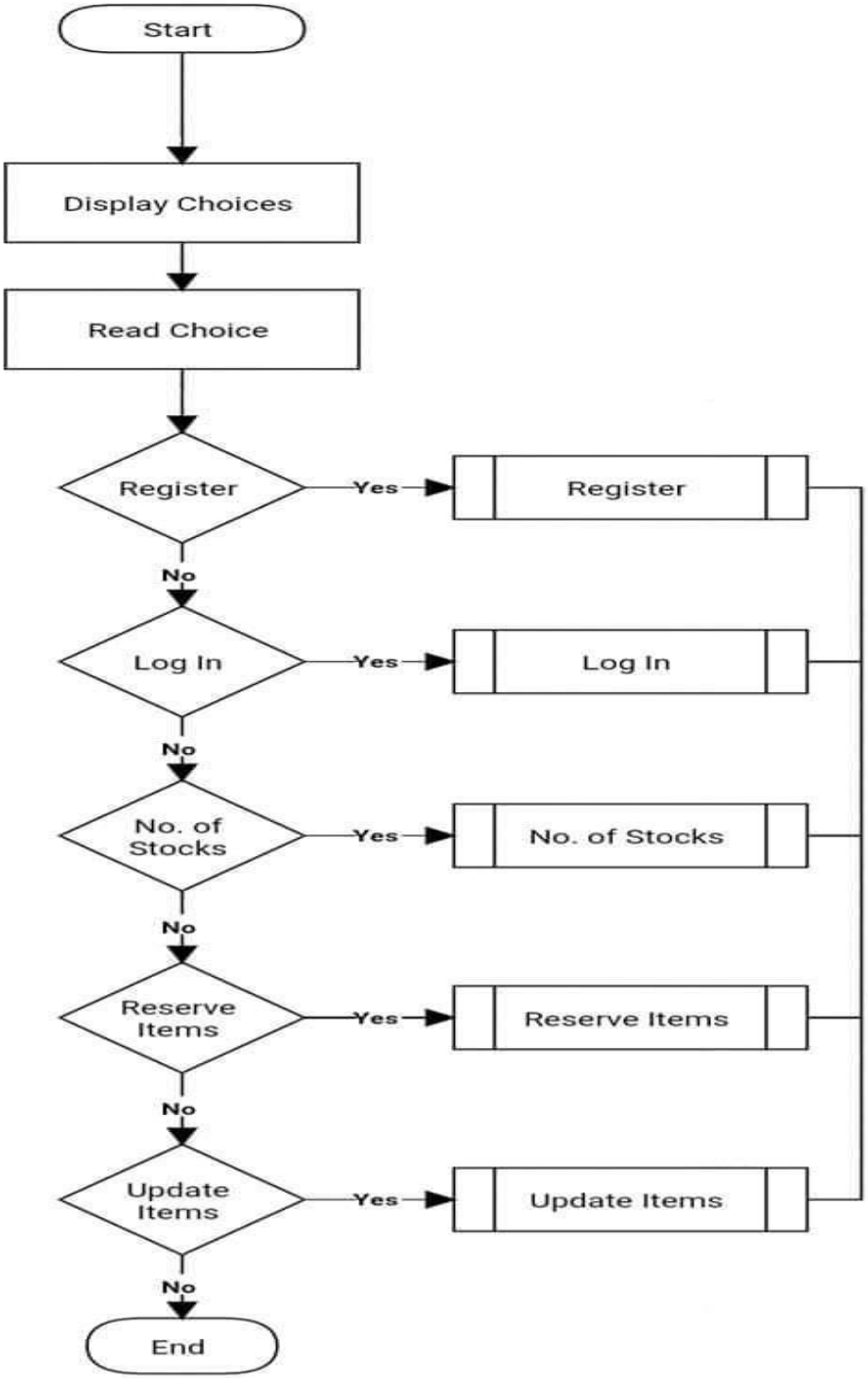
Data Flow Diagram



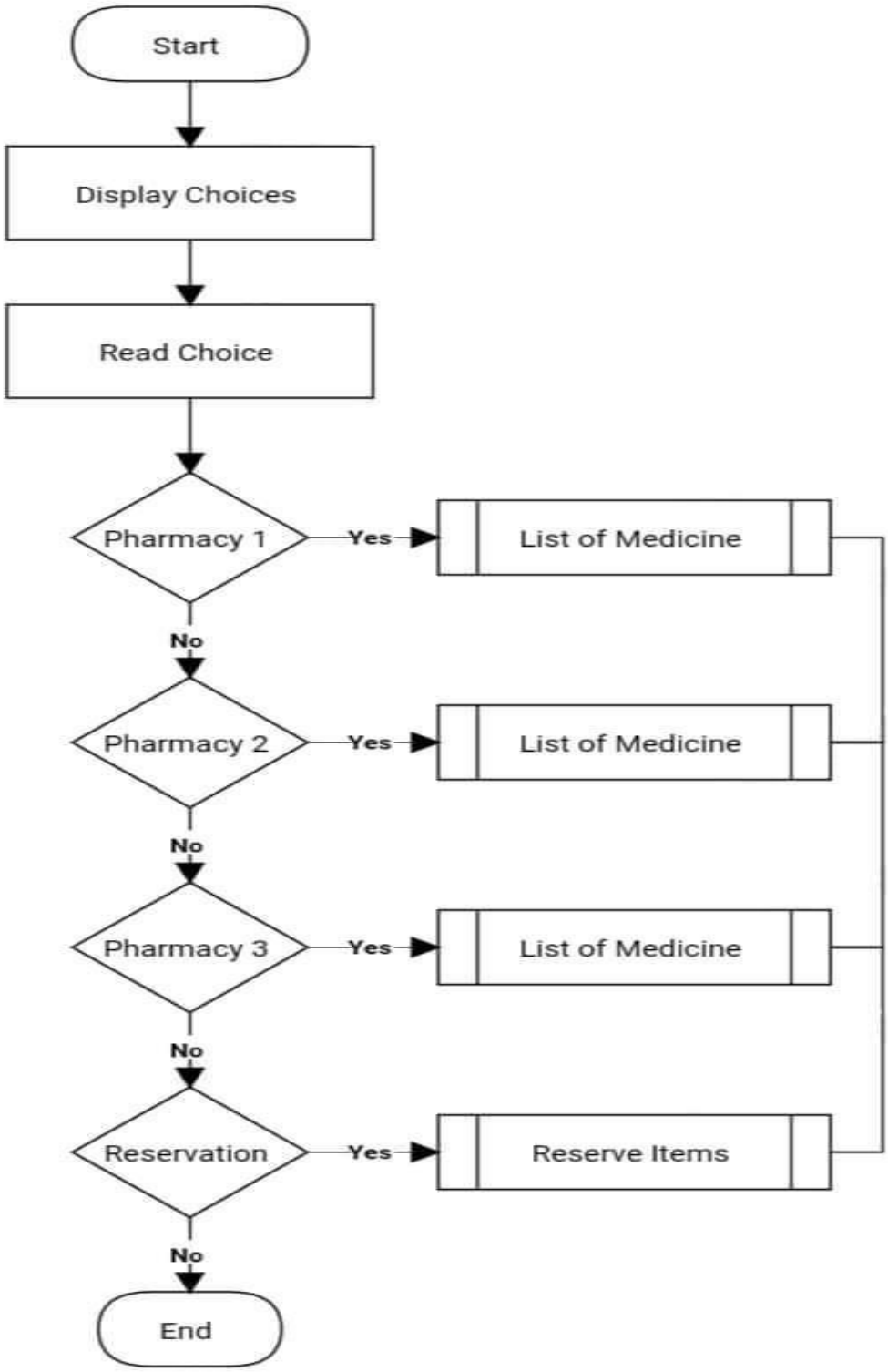
Flowchart Main Menu



Flowchart Pharmacist



Flowchart Customer



Bibliography

1. Articles in journals, magazines and news papers

Journal article, one author, accessed online

Agnieszka M. (2020), Top Apps Made with Flutter – 18 Stories by Developers and Business Owners. Droids on roids

Top Apps Made with Flutter – 18 Flutter App Examples with Insights (thedroidsonroids.com)

Namita (2017), Pharmacy Management System Data Flow. Free Projects

Pharmacy Management System Dataflow Diagram (DFD) FreeProjectz

Wigmore I. (2013), Mobile App. Techtarget

What is mobile app? - Definition from WhatIs.com (techtarget.com) Yolanda S. (2019), Community Pharmacy https://www.news-medical.net/amp/health/Community-Pharmacy.aspx Yolanda S. (2019), Community Pharmacist https://www.news-medical.net/amp/health/Community-Pharmacy.aspx **Journal article, more than two authors, accessed online**

Choi A., Lovett A.W., Kang J. & Lee K.M, Choi L. (2016) *Mobile Applications to Improve Medication Adherence: Existing Apps, Quality of Life and Future*

Direction. Available from College of Pharmacy, Mercer University, United States. (UMI No.64-74) DOI: 10.13189 http://www.hrpub.org

Jacob S.A., Palanisamy U.D., & Yie-Chuen Chong E. (2019) *A qualitative study on the design and development of a mHealth app to facilitate communication with the Deaf community: perspective of community pharmacists*. Available from Dove Medical Press Journal. https://www.dovepress.com

Thinnukool, O., Khuwuthyakorn P., & Wentong P. (2017) Pharmacy Assistant Mobile Application (PAMA). https://online-journals.org/index.php/i-jim/article/view/6757

2. Books

No author or editor, in print

Community Pharmacy Guide COVID-19 Preparedness (2020)

PHILIPPINES-PPhA-Community-Pharmacy-Guide-COVID-19-Preparedness.pdf (fip.org)

Free Project (2018), Pharmacy Management System UML Diagram

Pharmacy Management System UML Diagram | FreeProjectz

The Internet Pharmacy Market (2016), LegitScript.

https://safemedsonline.org/resource/the-internet-pharmacy-market-in-2016trends-challenges-and-opportunities/

One author, in print

Friesen, Jeff (2019), Learn Java for Android Development. Springer Link

https://link.springer.com/book/10.1007/978-1-4302-6455-2

Two authors, in print

Flick Tony, Morehouse Justin (2011), Securing the Smart Grid. Science Direct

Securing the Smart Grid | ScienceDirect

3. Theses/Dissertations

Theses/Dissertation, accessed online

Huang H-C., & Pou-Jen (2019). *Intelligent Technology Enhances the Friendliness of the Pharmacy Care Service.* Available from ResearchGate.net and Theses database. DOI 10.1109/TAAI48200.2019.8959839 https://ieeexplore.ieee.org/document

Kubra, A. N., Brundha N., Nethra S., Sivasakthi V., & Vasugi R. (2017). *Mobile application for checking the status of stock availability in pharmacy.* Available from IEEE Xplore.

MacKellar B. & Leibfried M. (2018). *Designing and building mobile pharmacy apps in a healthcare IT course.* Available from ACM DIGITAL LIBRARY. https://dl.acm.org/doi/10.1145/2512276.2512304

Malhorta N. (2016). *MedTrack: A Mobile Application for Patients, Physicians and*

Pharmacies; Track Your Med-Health on the go. Available from scholarworks.csun.edu.and Theses database. http://scholarworks.csun.edu/bitstream/handle

Rifgi S. E., Saiful A. & Fitra A. (2017). *The MedMaps apps: Mobile application for Finding, Managing and Commercialize Pharmacy.* Available from IEEE Xplore and Theses database. (UMI No. 978-1-5090-6255-3) DOI: 10.1109/ICT-ISPC.2017.8075306 https://www.semanticscholar.org/paper/The-MedMaps-apps

Sheikh, G.S & Islam N. (2016). *A qualitative study of major programming languages to computer science students.* Available from ResearchGate.net (UMI No.75190) https://www.researchgate.net

5. Encyclopedia or dictionaries and entries in an encyclopedia

Article from an online encyclopedia

Mobile applications (2017), Technopedia

What is a Mobile Application? - Definition from Techopedia

Pharmacy. (2017). In Encyclopedia Britannica. From https://www.britannica.com/science/pharmacy/additional-info