

**NIZWA COLLEGE OF TECHNOLOGY
MOBILE LIBRARY ASSISTANT**

ANA MARIA B. PASCUAL

**Faculty of Information and Communication Studies
U.P. OPEN UNIVERSITY
2019**



**UNIVERSITY OF THE PHILIPPINES
OPEN UNIVERSITY**

Master of Information Systems

Ana Maria B. Pascual

**NIZWA COLLEGE OF TECHNOLOGY
MOBILE LIBRARY ASSISTANT**

Thesis Adviser:
Concepcion L. Khan
Program Chair, Master of Information Systems

Date of Submission
28 May 2019

Permission is given for the following people to have access to this thesis:

Available to the general public	Yes
Available only after consultation with author/thesis/ adviser	Yes
Available only to those bound by confidentiality agreement	Yes

Student's Signature:

Signature of Thesis/Dissertation/Adviser:

University Permission Page

"I hereby grant the University of the Philippines a non-exclusive, worldwide, royalty-free license to reproduce, publish and publicly distribute copies of this thesis in whatever form subject to the provisions of applicable laws, the provisions of the UP IRR policy and any contractual obligations, as well as more specific permission marking on the Title Page."

"Specifically, I grant the following rights to the University:

- a) To upload a copy of the work in the theses database of the college/school/institute/ department and in any other databases available on the public internet;*
- b) To publish the work in the college/school/institute /department journal, both in print and electronic or digital format and online; and*
- c) To give open access to above-mentioned work, thus allowing "fair use" of the work in accordance with the provisions of the Intellectual Property Code of the Philippines (Republic Act No. 8293), especially for teaching, scholarly and research purposes."*

Ana Maria B. Pascual 28 MAY 2019

Student Name over Signature and Date

© 2019 By Ana Maria B. Pascual

This thesis titled Nizwa College of Technology Mobile Library Assistant is hereby accepted by the Faculty of Information and Communication Studies, U.P. Open University, in partial fulfillment of the requirements for the degree Master of Information Systems.

Members of the Academic Advisory Committee:

_____Concepcion L. Khan_____, Chair, Advisory Committee
(Signature over printed name)

15 Aug 2019
(Date)

Concepcion L. Khan, Member, Advisory Committee
(Signature over printed name)

15 Aug 2019
(Date)

_____, Member, Advisory Committee
(Signature over printed name)

(Date)

Alexander G. Flor, PhD, Dean Faculty of Information and
(Signature over printed name) Communication Studies

081519
(Date)

Table of Contents

ABSTRACT..... 1

THE PROBLEM DOMAIN..... 2

 Statement of the Problem 3

 Significance and Scope of the Project..... 3

 Documentation of Existence and Seriousness of the Problem..... 3

REVIEW OF EXISTING ALTERNATIVES 4

THEORETICAL FRAMEWORK 5

 Rationale of the Framework 6

METHODOLOGY 7

 Concept..... 7

 Methods 8

 Project Assessment 9

RESULTS AND DISCUSSION 12

CONCLUSION AND RECOMMENDATIONS 16

BIBLIOGRAPHY 17

List of Tables

Table 1. Pre-test Survey Results 14

Table 2: Post-test Survey Result 15

List of Figures

Figure 1: Perceived Usefulness Model 5

Figure 2: Use Case Analysis Diagram 8

Figure 3. Pre-Test Survey Questionnaire..... 10

Figure 4. Post-Test Survey Questionnaire 10

Figure 5. Percentage of staff/student as respondents of the project..... 12

Figure 6. Percentage of respondents who owns a smartphone/tablet 13

Figure 7. Percentage of the smartphone/tablet model used by the respondents.. 13

Biography

Ana Maria Benitez-Pascual graduated Bachelors in Computer Science from Central Colleges of the Philippines in 2007. She was born and raised by her parents in the Philippines together with her five siblings. She was married to Alvin and have two sons named Amir and Aerys.

At the age of 18, she started working as a student laboratory assistant while she was studying. After taking her Bachelor's degree, she proceeded to work in the Information Technology industry for local and international companies and developed her skills as a Front-end developer. She also worked as a part-time computer instructor in the Central Colleges of the Philippines.

After several years of gaining experience in the IT industry, she took a break from being a career-woman to settled her own family and moved temporarily in Oman where his husband is working. A year later, she got an opportunity to continue working as a Front-end developer in a home-based setup. Being a mother and wife did not stop her willingness to learn and explore new things. She pursued her goal of taking a Master's degree in University of the Philippines Open University under the Master of Information Systems Program.

Acknowledgement

I would like to take this opportunity to express my gratitude to everyone who supported and believed in me. I am grateful for your words of encouragement and motivation that helps me persevere to walk through MIS (Master of Information Systems) journey.

To my parents and brothers, thank you for believing and supporting my interest to continue studying.

To my former mentor, Mr. Emmanuel Caparas, and to my former professor Mr. Juanito Macabanti III, who also became my friends, thank you for being my referral to enter UP Open University.

To my friends, Mr. Mark Lester Reyes, Mr. Froilan Buelo, and Mr. Rolen Yabut, I am grateful for your technical knowledge and ability that you willingly share to help me accomplish this project.

My deepest gratitude to all the members of the Faculty of Information and Communication studies, especially to my professor for all the guidance and knowledge that you've shared.

Finally, I would like to express my gratitude to my husband, Mr. Alvin S. Pascual, for the love, support and understanding. And to my children , Amir and Aerys who inspires me to become a better person and accomplish my goal.

Dedicated to:

Alvin S. Pascual
Amir Gabriel B. Pascual
Aerys Gabe B. Pascual
Benitez Family
Pascual Family
Mr. Emmanuel Caparas
Mr. Juanito Macabanti III
Mark Lester Reyes
Froilan Buelo Jr.
Rolen Yabut

ABSTRACT

NCT Mobile Library Assistant is a mobile application of library system of Nizwa College of Technology to run in Android platforms by providing a downloadable APK (Android Application Package), which aims to increase the rate of usage of the academic library and make collections more accessible to students, faculty members and staff. The application aims to take advantage of the technology that will help analyze user's usage and level of engagement and satisfaction to library that can benefit to the improvement of services and facilities currently being offered.

Nowadays, Nizwa College of Technology has a high expenditure on the library system that is not being fully maximized by students and staff. The proposal of developing an accessible, adaptable and user-friendly mobile library application can lead to high percentage of usage and new method of engaging students and staff to further promotes the library services.

NCT Mobile Library Assistant application was integrated to the existing online library system of the school using software development life cycle methodology, Ionic which is a powerful HTML5 SDK that mainly focus on the look and feel, and UI interaction using web technologies like CSS, HTML and Javascript, AngularJS and Lumen which is a PHP micro framework to build an application interface.

NCT Mobile Library Assistant application was tested out by several students, staff and faculty members of Nizwa College of Technology.

I

THE PROBLEM DOMAIN

Students nowadays, barely rely on the information from Internet; school libraries most often are being disregarded. The allotted budget in building a library facility is not being fully maximized.

Libraries are now facing a challenge on how to meet the rapidly evolving technology. Library system should think of innovative way to cope up to endless changes of technology and retain its significance in an institution.

Statement of the Problem

The project aims to adapt to the technological challenges that current library systems are facing and promote its relevance to an institution. Mobile library application is one innovative method in providing more reachable way to access library information.

The project aims to provide answers to the following:

1. How library collections can be quickly accessible to students, faculty members and staff without a delay aside from having a web application, which you need to use a browser to get into the system?
2. How to increase the rate of usage of students, faculty members and staff to the library's collection.
3. How to increase the level of interaction/engagement of students, faculty members and staff to school librarians?

Background and Objective of the Project

The project has been initiated as an enhancement to the existing online library system of Nizwa College of Technology, which aims to meet the following objectives:

1. To develop a mobile application available to Android devices, that can provide quick access to the library's collection without a delay or human intervention or be physically inside the academic library.
2. To promote library services and facilities and engage students, faculty members, and staff to use those.
3. To implement an application that creates two-way communication between library management and its users to gather feedback and provide a better quality of service.

Significance and Scope of the Project

The implementation of mobile library application will be beneficial to the Nizwa College of Technology students, faculty members, staff and the school librarian. Students, faculty members, and staff will be able to have quick access to library collections with the tip of their thumb using their smartphones/tablets. School librarian's workload will be lessened because a user can have a full inquiry to the library collections without even asking them. Library transactions will be more efficient and hassle-free.

The project aims to implement the following:

1. Mobile library application is available using smartphones/tablets in the Android platform.
2. Mobile library application that allows users to manage own profile such as name, e-mail address, and contact number.
3. Mobile library application that enables users to view/search collections and reserve available library resources.
4. Mobile library application that allows users to send feedback and inquire from the librarian.

Documentation of Existence and Seriousness of the Problem

Libraries nowadays are facing a challenge on how to keep pace to rapidly changing technology and ensure they can still provide services and retain its significance in society.

Use of smartphones/tablets proliferated significantly and change how information is structured, established and disseminated. People hardly rely on the Internet and their computers and/or smartphones or tablets to get a quick answer to their inquiry. With how we collect information today, libraries became insignificant, especially to students. Students commonly use their technological devices to access information swiftly and efficiently which results in ignoring the academic library provided by the school.

There is a need for the libraries to upgrade and cope up on how technology proliferates in society. To retain its significance in society, it needs to understand the benefits of mobile devices to the learning process of students and innovate how to quickly and efficiently provide highly relevant information.

II REVIEW OF EXISTING ALTERNATIVES

Boopsie for Libraries serves an inspiration to propose a mobile library application. Boopsie develops a mobile application for libraries with customization capability like uploading of the company logo, images, and artwork. It also provides in-app mobile catalog searches and mobile access to library services. Boopsie also offers ILS Integration, additional eContent Integration, Library Locator and Social tools.

Alexandria Library Mobile App, like other mobile library applications, allow users to access library resources anytime and anywhere. It also provides user account access where a user can use his or her library card number and pin to check due dates, place a hold, renew a book, and alerts when books are due or hold become available. Alexandria has an interface to search catalogs by author, title, subject, barcode or keyword and event listings showing library activities.

This project was inspired by those existing mobile application and applied the key components of library services, which also takes into consideration the available resources of Nizwa College of Technology and give them an option to build the application according to their patrons' prerequisites.

Chapter III

THEORETICAL FRAMEWORK

Innovation to the traditional library system has become a challenge to adopt on how technology changes the way we look for the answer to our questions. There has been an effort from the educational institutions to upgrade the services of their libraries by creating an online system where their users can easily search for resources with the use of laptops and desktop computers however there are research studies, which shows that in spite of the availability of the system there is a likelihood that it will not be used by potential users especially nowadays where our society is rapidly proliferated by mobile devices such as smartphones/tablets, laptops and computers which we use to instantly access information, human intervention serves as a potential barrier to convenience.

This project aims to provide a mobile library assistant application and applies the technology acceptance model (TAM) as a theoretical framework. According to TAM usage of an information system is determined by users' intention to use the system, which in turn is determined by users' beliefs about the system. TAM suggests that when users are presented with new technology, a number of factors influence their decision about how and when they will use it, notably:

Perceived usefulness which was defined by Fred Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance".

Perceived ease-of-use which Davis as "the degree to which a person believes that using a particular system would be free from effort" also defined. Figure 1. Shows Perceived Usefulness Model

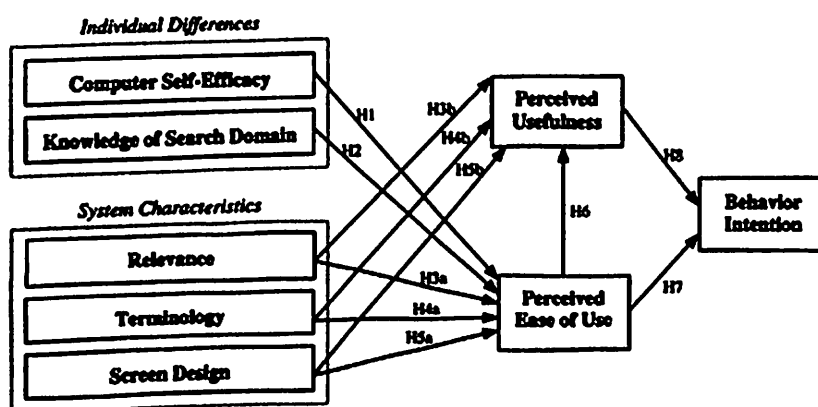


Figure 1: Perceived Usefulness Model

The project aims to apply TAM to develop an application that can lead to a significant increase in usage rating of the library resources and promotes the services being offered.

Rationale for the Framework

The project, using the technology acceptance model, aims to maximize the use of academic library resources and retain its relevance to the educational institution. Determining the perception of potential users on their likelihood to use the library resources and consider it as a factor to build a mobile application.

Even if the institution provides an online library system accessible via web browsers using laptops or computers the likelihood of a user to access information is low. This was the effect of the emergence of mobile technologies.

Nowadays, users perceive that by providing mobile applications will give them quick and autonomous access to highly relevant information.

Using the mobile library assistant application will bring convenience to library users without a physical intermediary to have quick access to know if the availability of library resources they are looking for. When the user feels the convenience of use it will result in a high probability of using the services frequently thus leads to maximization of budget and resources allocated.

IV METHODOLOGY

Concept

The mobile library assistant application offers the following features:

1. User Account Management
 - a. The application provided an interface where the user can modify , contact numbers, e-mail address. Student number and employee identification number will be used to as the username to access the application.
 - b. The application will also handle active and inactive users.
2. Catalog Search/ View
 - a. The application will provide an interface where a user can search books using book identification number or the ISBN.
 - b. The interface will also show the availability of the book and its corresponding details such as title, author, and ISBN.
3. Book Reservation
 - a. The application provided interface where a user can reserve an available book.
 - b. A notification or proof transaction will be sent to registered email address.
 - c. A notification will be sent when books are due.
4. Ask a Librarian
 - a. The application provided an interface where the user can inquire from the librarian.
5. New Resource Acquisition
 - a. The application provided an interface displaying the recently added books for the last 30 days.

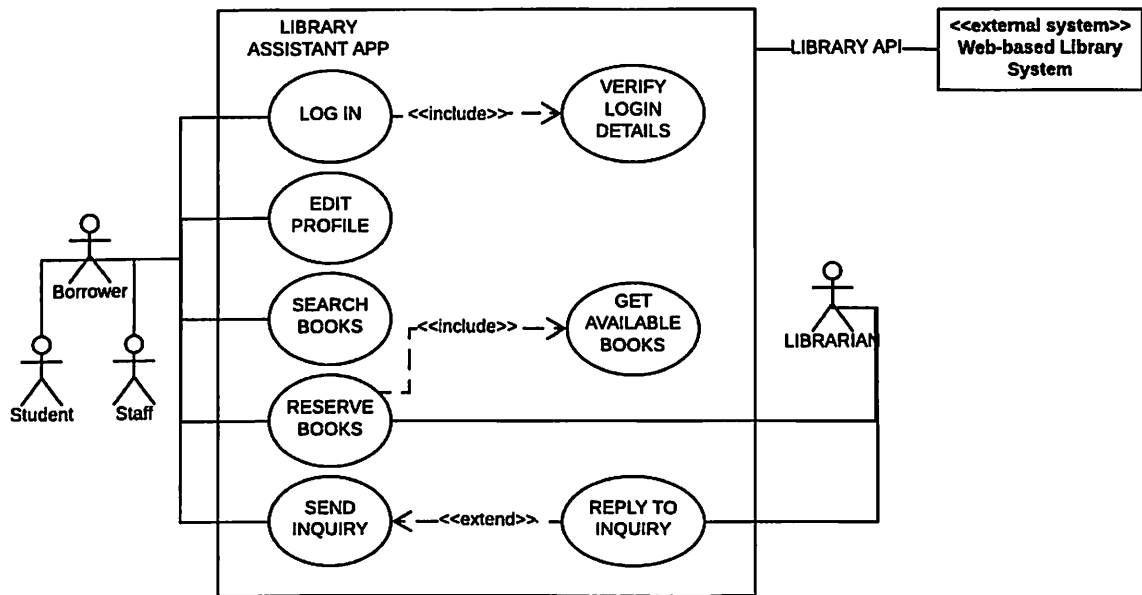


FIGURE 2. Use Case Analysis Diagram

Methods

Software development life-cycle methodology has been applied to guide the process in building the mobile library application for Nizwa College of Technology.

Analysis and evaluation of current online library system of NCT and existing mobile library application such as Boopsie for libraries, Alexandria Library, and MyLibrary, took place in gathering of ideas and became an inspiration in development of the project.

The existing online library system of Nizwa College of Technology uses PHP (Hypertext Preprocessor) and MySQL for database management and an API was built using Lumen PHP Micro-framework to communicate to the database. Lumen is a PHP micro framework that helps developers to quickly write simple yet powerful web applications and APIs. Lumen is a great tool for rapid prototyping and an ideal tool to create APIs that consume, repurpose or publish data.

The frontend interface was built using the first version of Ionic Framework which is a completely free and open source SDK that empowers developers to build performant, high-quality mobile applications using familiar web technologies such as HTML, CSS, and JavaScript.

The project developed a mobile application that runs on Android devices which was based from the result of the pre-test survey that there are more users who used smartphones/tablets that runs in Android platform.

The project provided a downloadable APK - an Android application package, that can be installed on Android devices.

Project Assessment

The project determined the effectiveness and success of the application by using pre and post test surveys.

Following questions were chosen to support the key objectives of the project.

1. Pre-test Survey (NCT Online Library System)

- a. Please select the category that describes your role in relation to Nizwa College of Technology
- b. Do you have a smartphone/tablet?
- c. What is the model of your smartphone/tablet?
- d. I am using the Online Library System to search and reserve a book.
- e. The online library system is easy to use.
- f. I can search and reserve books immediately.
- g. I can navigate on the website using my smartphone/tablet.
- h. I am using my smartphone/tablet to navigate to the Online Library System.
- i. I would be happy if there is a mobile version of the Online Library System where I can search and reserve a book using my smartphone/tablet.

2. Post-test Survey (NCT Mobile Library Assistant Application)

- a. Usability
 - i. The mobile library assistant is easy to use.
 - ii. I can easily search and reserve for a book.
 - iii. I can navigate to the application easily.
- b. Credibility
 - i. I feel comfortable using the mobile application to search and reserve books
 - ii. The information in the mobile application is accurate
 - iii. I feel that this mobile application is valuable.
- c. Loyalty
 - i. I will recommend this mobile application to your colleague or classmates?
 - ii. I will use this mobile application in the future.
- d. Appearance

- i. This mobile application provides a neat and simple interface.

The Pre-Survey questionnaire items except a,b, and c use a five point scale from strongly disagree to strongly agree. Questions a,b,c are subject to users preference.

The Post-Survey questionnaire items used a five point scale from strongly disagree to strongly agree.

Figure 3 displays the Pre-Survey questionnaire used by this project.
Figure 4 displays the Post-Survey questionnaire used by this project.

1 Please select the category that describes your role in relation to Nizwa College of Technology	Yes	No			
2 Do you have a smartphone/tablet?	Yes	No			
3 What is the model of your smartphone/tablet?	Apple	Samsung	Huawei	Google	Others
4 I am using the Online Library System to search and reserve a book.	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
5 The online library system is easy to use.	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
6 I can search and reserve books immediately.	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
7 I can navigate easily on the website	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
8 I can using my smartphone/tablet to navigate to the Online Library System.	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
9 I would be happy if there is a mobile version of the Online Library System where I can search and reserve a book using my smartphone/tablet.	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5

Figure 3. Pre-Test Survey Questionnaire

The mobile library assistant is easy to use.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I can easily search and reserve for a book.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I can navigate to the application easily.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I feel comfortable using the mobile application to search and reserve books	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
The information in the mobile application is accurate	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I feel that this mobile application is valuable.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I will recommend this mobile application to your colleague or classmates?	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
I will use this mobile application in the future.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
This mobile application provides a neat and simple interface.	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5

Figure 4. Post-Test Survey Questionnaire

For the post-test survey, the project aims to get a score at least 50 percent which is 22.5 points of the total possible score 45 points. SUPR- Q score will be based by adding up the responses of the 8 given questions and divided to half ($\frac{1}{2}$).

The pre-test survey uses SUPR- Q for the 6 questions to measure the usability,credibility, loyalty and appearance of the existing online library system.

The percentage of the first three questions in pre-test survey was given to determine the platform which are commonly used by students and staff/teacher of Nizwa College and technology.

V

RESULTS AND DISCUSSIONS

The project released an Android application sent to 18 respondents composed of staff/teacher and students. The respondents were able to search, view, and reserve a book from the application and were also able to manage their email address and mobile number using the application.

The project used a questionnaire using the Standardized Universal Percentile Rank – Questionnaire (SUPR-Q) to measure the essential elements of the mobile application - usability, credibility, loyalty, and appearance.

Results

Pre-test survey results were interpreted as follows:

A total 55.6% from 18 respondents of the survey are students and the remaining 44.4% are staff/teacher.

Figure 4. Shows the percentage of staff/student in Nizwa College of Technology out of 18 respondents of the project.

Question: Please select the category that describes your role in relation to Nizwa College of Technology

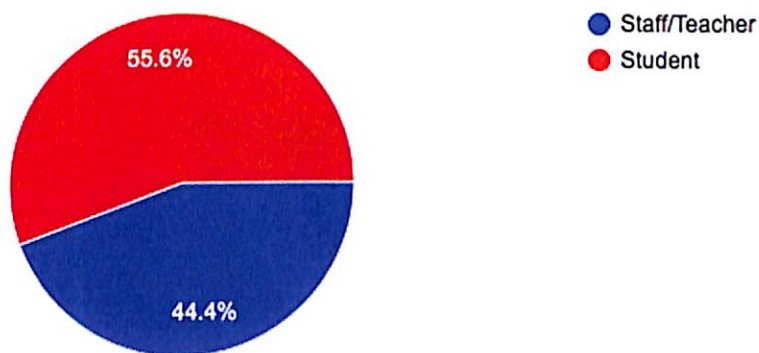


Figure 5. Percentage of staff/student as respondents of the project.

A total of 100% from 18 respondents uses smartphone/tablet.

Figure 5. Shows the percentage of respondents who owns a smartphone/tablet.

Question: Do you have a smartphone/tablet?

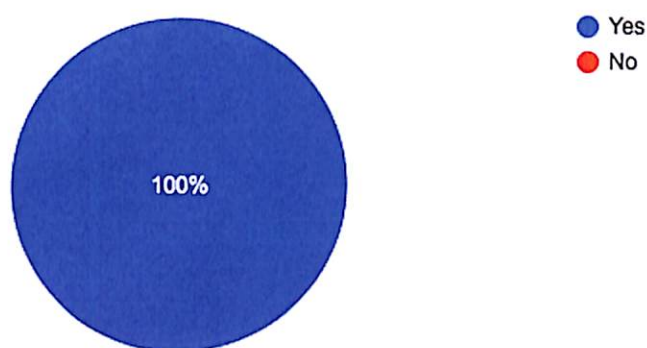


Figure 6. Percentage of respondents who owns a smartphone/tablet

A total of 38.9% from 18 respondents uses a Samsung device model, 38.9% uses Huawei device model remaining 22.2% uses Apple device which runs in IOS platform. Samsung and Huawei devices runs in Android operating system. The question item is one of the deciding factor in developing the mobile library assistant on Android devices.

Figure 6. Shows the percentage of the model of smartphone/tablet used by 18 respondents

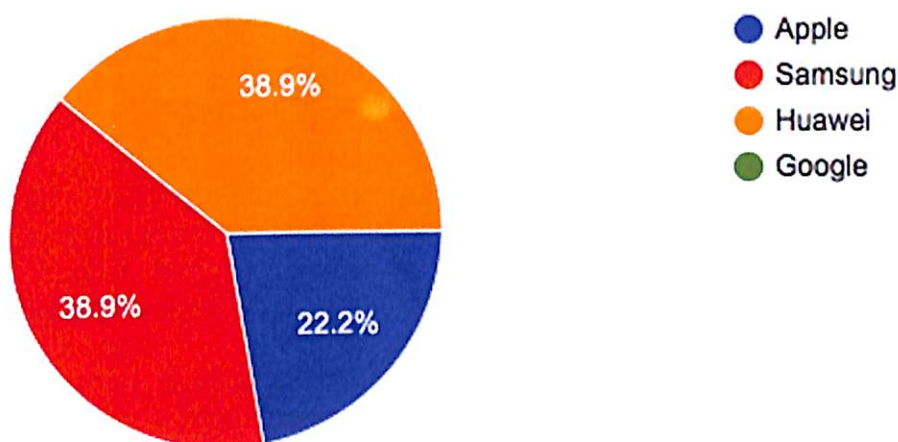


Figure 7. Percentage of the smartphone/tablet model used by the respondents

Question	Average Score (1-5)	Percentage
I am using the Online Library System to search and reserve a book.	3.11	62.22 %
The online library system is easy to use.	2.61	52.22%
I can search and reserve books immediately using the online library system.	2.055	41.11%
I can navigate easily on the website	2.16	43.33%
I am using my smartphone/tablet to navigate to the Online Library System.	1.055	21.11%
I would be happy if there is a mobile version of the Online Library System where I can search and reserve a book using my smartphone/tablet.	4.22	84.44%

Table 1. Pre-test Survey Results

The pre-test survey results were categorized and measured by usability, credibility, loyalty and appearance of the existing online library system. Based on 18 respondents, the overall average score is 15.21 which has an equivalent 50.7 percentage of the total possible 30 points score of the questionnaire.

The pre-test survey overall average 50.7% of SUPR-Q score determines that the existing online library system is neutrally maximized by the staff/teacher, and students of Nizwa College of Technology.

Post-test survey results were interpreted as follows:

Question	Average Score 1-5	Percentage
The mobile library assistant is easy to use.	4	80%
I can easily search and reserve for a book.	4.16	83.33%
I can navigate to the application easily.	4.16	83.33%
I feel comfortable using the mobile application to search and reserve books	4.11	82.22%
The information in the mobile application is accurate	4	80%
I feel that this mobile application is valuable.	4	80%
I will recommend this mobile application to your colleague or classmates?	4	80%
I will use this mobile application in the future.	4	82.22%
This mobile application provides a neat and simple interface.	3.88	77.77%

Table 2: Post-test Survey Result

The survey results were categorized and measured by usability, credibility, loyalty and appearance of the mobile library assistant application. Based on 18 respondents, the overall average score of SUPR-Q of the mobile application is 36.31 which is 80.68% of the total possible score 45 points of the questionnaire.

The post-test survey overall average 80.68% of SUPR-Q score determines that NCT Mobile Library Assistant application will help to extend and maximize the usability of the college’s library resources and that the users can feel more satisfaction in using mobile applications nowadays instead of the browser-based/desktop systems.

VI CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The project was developed using Lumen for creation of API (Application Programming Interface) which communicates to the existing web-based version of the library system and Ionic Framework for building the user interface of the application.

The project provided the Android Application Package to the 18 respondents composed of student, and staff/teacher of Nizwa College of Technology. From the survey results gathered, use of smartphones/tablets are highly preferable by the users nowadays where they can easily do transaction on their palm of their hands. The existing online library system reached a neutral satisfaction from it's user and that by providing a mobile application of the system will give more satisfaction.

The percentage of 80.68% of SUPR-Q score determines that NCT Mobile Library Assistant application can give user a feeling of more satisfaction of having a mobile version of the library system.

RECOMMENDATIONS

The following items were recommended to further enhance the first version of the mobile application.

1. By providing an IOS version of the application can add to the number of patrons that can use it.
2. The user interface can be elevated to be more appealing to the users.
3. The application can extend the available features which might add to it's value in terms of usability and engaging of more users.
4. Agile methodology is more likely applicable on the project to be used on its successive version wherein the end-user can see results easily in smaller pieces and the team will be more flexible in adapting to changes. The possibility of testing, engagement (both by client and developers) to deliver a successful application will be of great extent.

BIBLIOGRAPHY

Boopsie for Libraries

<http://www.boopsie.com/>

Alexandria Library

<https://itunes.apple.com/us/app/alexlibva/id661693274?mt=8>

MyLibrary!

<https://www.iii.com/community/videos/1154>

API(Application Program Interface)

<http://www.webopedia.com/TERM/A/API.html>

Lumen PHP Micro-Framework By Laravel,

<https://lumen.laravel.com>

Ionic framework,

<http://ionicframework.com/>

Developing Adaptable , Efficient Mobile Library Services, Librarians as Enablers,

<http://www.ariadne.ac.uk/issue73/caperon>

Theories in IS

<http://www.ariadne.ac.uk/issue73/caperon>

Nizwa College of Technology official website,

<https://www.nct.edu.om/>

Definition of Information Systems

https://en.wikipedia.org/wiki/Information_system

Information System Success: Individual and Organizational Determinants

<https://www.yumpu.com/en/document/view/18930719/information-system-success-individual-and-transtutors>

APK, Android Application Package

https://en.wikipedia.org/wiki/Android_application_package