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Barangay Integrated Management System with Mobile Support

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Abstract– *Due to the prevailing pandemic, managing public demands must be granted with utmost precautions while maintaining better and faster services to the people. The purpose of this study is to improve public services of the barangay office and barangay health center by developing a system that will centralize data from barangay health center and barangay office, manage barangay public information, filter constituents' profile as to requests, complaints, and health services availed, and display inventory of medical and office supplies. Moreover, to limit face to face transactions by developing a mobile application that will allow the registered users to set appointments and file complaints. Based on the thorough evaluation of the experts and respondents, the Barangay Integrated Management System with Mobile Support is highly usable, secured, efficient, and provides a fast and easy way to manage residents' profile, manage public information, manage supplies, manage complaints, set appointments, manage medical transactions, and generate significant reports. The study reflects that the barangay office and the barangay health center can greatly benefit by using the developed system in providing better and faster services to the people and limit face to face transactions by using the mobile application in registering complaints and setting appointments of the residents.*

Keywords– *Mobile application, database, system, integrated management system*

INTRODUCTION

In this age of advancement in technology, the emerging trend for Information Technology has risen above the surface of public works and services. The application of Information Technology in providing better services for the community becomes less of a choice but more of a requirement. With the help of web and mobile applications, it is easier to organize, store, and retrieve huge amounts of information. Barangay 16, formerly Población, is one of the 61 barangays in the city of Bacolod. According to the 2015 Census, its population was 7,998, representing 1.42% of the total population of Bacolod.

Due to the prevailing pandemic, the constituents' demands must be granted with utmost precautions. A pandemic caused by the novel coronavirus is causing an unprecedented situation for world's health services which adversely affects the health, local communities, and the government (Zhao et.al, 2021). However, without the aid of modern technology, the barangay and health center staff are having a hard time managing requests and entertaining guests at the same time. According to The World Bank, the use of digital technologies such as digital payments, e-commerce, telemedicine, online education, is rising in the Philippines and has helped individuals, businesses, and the government cope with social distancing measures, ensure business continuity, and deliver public services during the pandemic. In order to provide faster and better services to the people, the barangay must embrace the potential of IT products that offer efficient way of managing information - letting go the current processes of the barangay that uses manual transactions such as requesting documents and certificates, recording and retrieving residents' personal and health information, managing complaints, etc.

The Barangay Integrated Management System with Mobile Support is an integrated system that stores, processes, retrieves, and updates barangay related data. It provides a centralized management for web and mobile applications that caters faster management of barangay profile, constituents' profile, document processing and requests, complaints, etc. There are existing barangay integrated management systems that were developed and are being used today but this system will be customized based on the needs of the client. It can manage centralized information from the barangay office and barangay health center. The system comes with a mobile application that can be used to report complaints, request documents, view barangay public information, retrieve health information, and request a queue number from barangay health center.

OBJECTIVES OF THE STUDY

This study aimed to develop a Barangay Integrated Management System with Mobile Support.

Specifically, it aimed to

1. Design a system that will
   A. centralize data from barangay health center and barangay office;
   B. Manage barangay public information;
   C. Filter constituents' profile as to requests, complaints, and health services availed;
   D. Display inventory of medical and office supplies
2. Develop a mobile application that will allow the registered users to set appointment and file complaints
3. Determine the quality of the developed system based on ISO/IEC 25010:2011 Systems and Software Quality Requirements and Evaluation (SQuaRE) Quality Model
4. To determine the usability of the proposed system in terms of usefulness, satisfaction, ease of use, and learning.

MATERIALS AND METHODS

The researcher used the descriptive developmental approach which is the systematic study of putting into design, developing and careful evaluation of instructional programs, processes and products that must meet the standard or criteria.

A. System Design

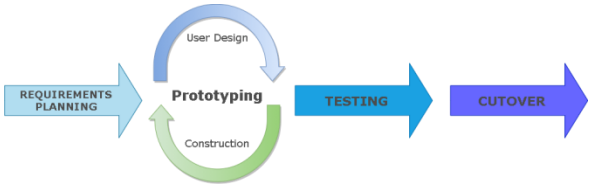

Figure 1. Rapid Application Development

The **Rapid Application Development (RAD)** is a development model that prioritizes rapid prototyping and quick feedback over long drawn out development and testing cycles. With rapid application development, developers can make multiple iterations and updates to software rapidly without needing to start a development schedule from scratch each time. Thru the entire course of the system development, the researcher did the following activities explained in the different phases:

Requirements Planning

In this phase, the users and analysts met to identify objectives of the application or system and to identify information requirements arising from those objectives. This phase required intense involvement from both groups; it was not just signing off on a proposal or document.

Prototyping

This phase required building, rebuilding, fixing, and refining the developed system using feedback from the IT experts.

Testing

There are a total of four stages of software testing, which include Unit Testing, Integration Testing, System Testing, and Acceptance Testing. With that said, these four stages can be collectively categorized into two types, the first two being verification stages while the last two are a part of the validation stage.

Cutover

This phase resembled the final tasks in the SDLC implementation phase, including data conversion, testing, changeover to the new system, and user training. Compared with traditional methods, the entire process is compressed. As a result, the new system was built, delivered, and placed in operation much sooner.

B. Research Design

Locale of the Study

This study took place in Barangay 16, Bacolod City, Negros Occidental. Specifically, the main proponent will be the barangay office and the health center.

Sample Size

Table 1. Sample Size

Participant	Population
Barangay Office Staff	5
Barangay Officials	11

Health Workers	5
Residents	30
Total Sample Size	**51**

Sampling Technique

The researcher gathered data from barangay office staff, barangay officials, and health workers determined using the purposive sampling technique while for the residents that took part in the testing of the mobile app, the researcher used the convenient sampling technique.

Respondents of the Study

The main participants of this study are the barangay officials and barangay workers, the doctor and workers of barangay health center, and the constituents of the target barangay.

Research Instrument

The researcher used both self-made and standard instruments to gather data and to evaluate the developed system.

Reliability and Validity of Research Instrument

The questionnaires were duly reviewed and validated by three (3) experts using the Carter V. Good and Douglas F. Scates tool in validating and evaluating a questionnaire. Results showed a grand mean of 4.47 which is interpreted as valid.

The self-made questionnaire has undergone a reliability test from a group of thirty (30) residents in Barangay 16, Bacolod City. Result is shown in Table 2.

Table 2. Reliability and Statistics

Cronbach's Alpha	**N of items**
0.809	16

Reliability as defined by Sevilla (1990) is the degree of consistency and precision a measuring instrument demonstrates. In the conduct of the reliability, a dry run was conducted to 30 other residents of the barangay. To determine the coefficient of correlation, Cronbach Alpha was used. The Cronbach Alpha is used whenever the researcher has items that are not scored simply as right or wrong (Carlson, 2004). Cronbach Alpha is a coefficient of reliability. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees.

$$\alpha = \frac{K\bar{c}}{(\bar{v} + (K-1)\bar{c})}$$

Where = K is as above

= $\bar{v}$ the average variance

= $\bar{c}$ the average of all co-variances between the components across the current sample of persons

The computed alpha was 0.809. According to Ornstein (1983), a coefficient of 0.80 or higher indicates high reliability. This means that the research instrument developed by the researcher was reliable to a high degree.

Data Gathering Procedure

The proponent used different data gathering tools which helped gather relevant information to achieve the goal of the proposed study. Here are the data gathering tools:

1. Observation. The researcher conducted observations to review processes in the barangay office and barangay health center.

2. Interview. The researcher conducted interviews with the stakeholders including barangay captain, barangay workers, barangay doctor, barangay health workers, and the residents about the processes involved in barangay office and barangay health center.
3. Internet Research. The researcher gathered additional information through the internet related to the study.
4. Survey questionnaire. The proponent provided surveys to all the users of the system for them to comment or write what are the needs and don't to the system made by the proponent.

Data Analysis Procedure

The data that were collected were analyzed using mean and grand mean with corresponding verbal interpretations.

Context Flow Diagram

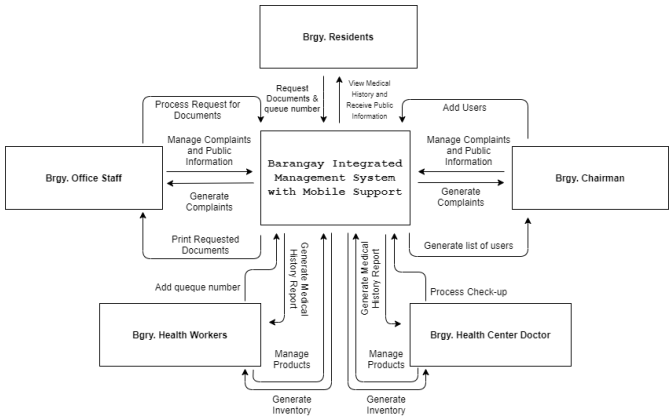

Figure 2. Context Flow Diagram

Figure 2 shows how the researcher maps out on how the entire features and components of the system will work together according to its purpose.

Application Architecture

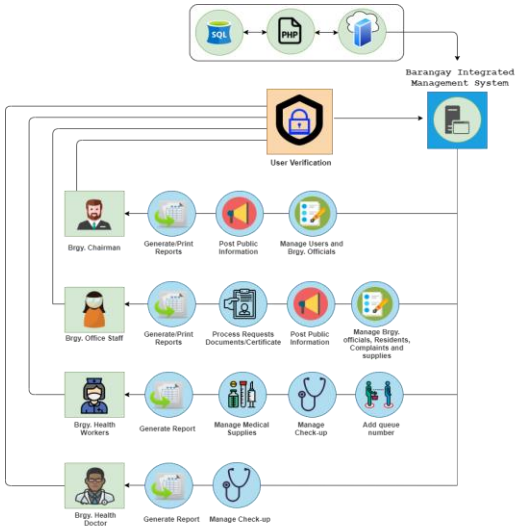

Figure 3. Application Architecture for Web Application

Figure 3 shows how the web app will work when used by the registered users.

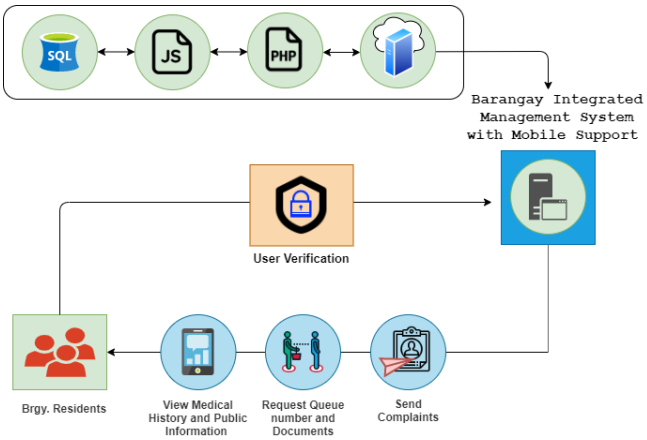

Figure 4. Application Architecture for Mobile Application

Figure 4 shows how the mobile app will work when used by the registered users.

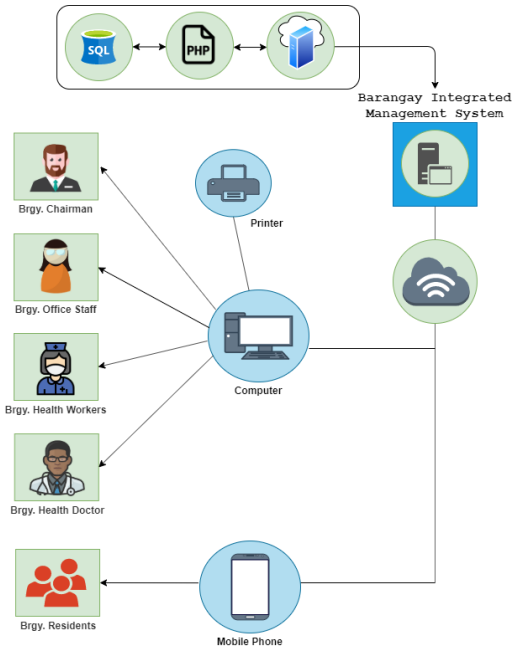

Figure 5. System Architecture Diagram

Figure 5 shows how the system will work when used by the registered users.

Software Requirements

Admin side:
Operating System (Windows 7,8, or 10)
PHP
Web Hosting/Server
MySQL
Client side:
Operating System (Windows 7, 8, or 10)
Web browser

Hardware and Other Required Devices

Admin side:
Processor: Intel Core i3 or higher
RAM: 2GB or higher
Hard Disk Drive: 500GB or higher
Printer
Internet Plan at least 5 Mbps
Mobile device:
RAM: 512MB or higher
Internal storage: 1GB or higher
Android version: 4.1 (Jelly Bean) or higher

Barangay Integrated Management System with Mobile Support Screenshots

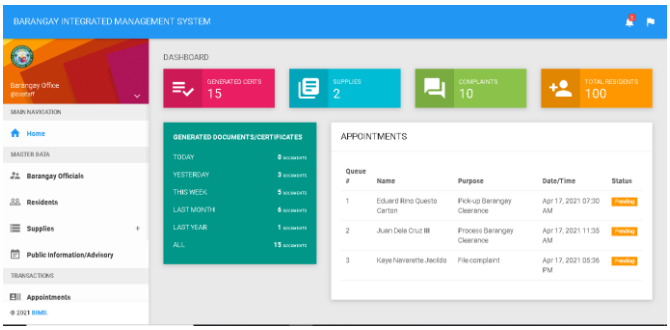

Figure 6. Barangay Office Main Page

Figure 6 shows the barangay office main page of the Barangay Integrated Management System with Mobile Support which allows the barangay workers to navigate through various navigations. The main page also displays the total number of generated certificates, total number of supplies, total number of complaints, total number of residents and list of pending appointments.

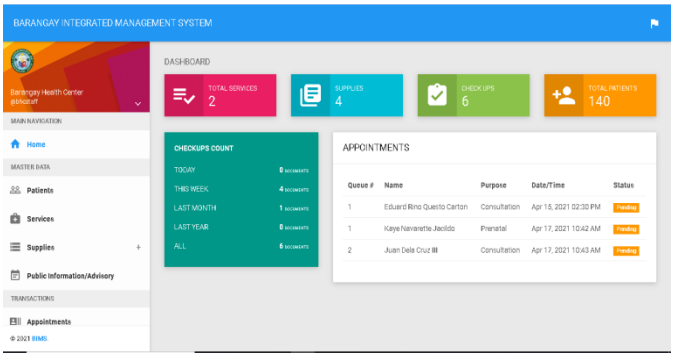

Figure 7. Barangay Health Center Main Page

Figure 7 shows the barangay health center main page of the Barangay Integrated Management System with Mobile Support which allows the barangay health workers to navigate through various navigations. The main page also displays the total number of services available, total number of supplies, total number of checkups, number of patients, and list of pending appointments.

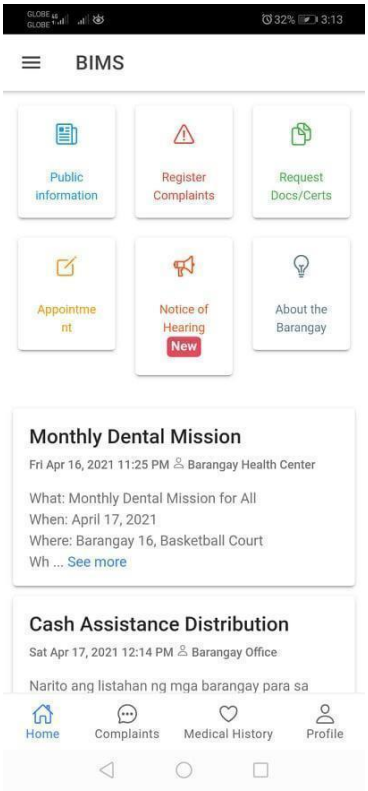

Figure 8. Mobile Application Dashboard

Figure 8 shows the mobile application dashboard of the Barangay Integrated Management System with Mobile Support which allows the barangay residents to navigate through various navigations.

RESULTS AND DISCUSSION

Based on the detailed presentation, discussions, interpretation, and analysis of research findings, the following summary is hereby presented:

1. In terms of centralizing records of Barangay Health Center and Barangay Office, it was rated with a mean value of 4.65, which is interpreted as Very Good.
2. In terms of managing barangay public information, it was rated with a mean value of 4.79, which is interpreted as Very Good as the result.
3. In terms of filtering constituents' profile as to requests, complaints, and health services availed, it was rated with a mean value of 4.81, which is interpreted as Very Good as the result.
4. In terms of displaying inventory of medical and office supplies, it was rated with a mean value of 4.68, which is interpreted as Very Good as the result.
5. In terms of mobile application allowing registered users to set appointments, file complaints, and view medical records, it was rated with a mean value of 4.77, which is interpreted as Very Good as the result.
6. In terms of determining the quality of the Barangay Integrated Management System with Mobile Support based on the characteristics set in ISO 25010 Software Quality Model, it was rated with a mean value of 4.66, which is interpreted as Very Good.
7. In terms of determining the usability of the Barangay Integrated Management System with Mobile based on usefulness, satisfaction, and ease of use and learning, it was rated with a mean value of 4.66, which is interpreted as Very Good.

CONCLUSION AND RECOMMENDATION

Conclusion

In the light of the findings of the study, the researcher concludes that, based on the thorough evaluation of the experts and respondents, the Barangay Integrated Management System with Mobile Support is highly usable, secured, efficient, and provides a fast and easy way to manage residents profile, manage public information, manage residents, manage supplies, manage complaints, set appointments, manage medical transactions, and to generate reports such as: complaints per resident, complaints per incident type, complaints per status, issued documents/certificates per resident, issued documents/certificates per document type, inventory of office supplies, and inventory of medical supplies. The Barangay Integrated Management System with Mobile Support improved public service of Barangay 16, Bacolod City.

The Barangay can greatly benefit by using the developed Barangay Integrated Management System with Mobile Support. It also serves as a fast and reliable tool for the barangay office in terms of easy and automatic release of requested certificates/documents, profiling of master data, scheduling of appointments and managing supplies more securely and accurately. For the Barangay health center it also serves as the fastest and timely for the staff to process medical services, tracking of medical history, managing medical supplies and profiling of patients' records. It is also very beneficial to the barangay residents to set appointments, receive public information and view medical history through mobile application to limit face to face transactions.

Recommendation

Based on the findings and conclusion drawn, the following recommendations are put forward:

1. The Barangay Integrated Management System with Mobile Support is recommended to be implemented to other barangays in Bacolod City.
2. Improve notification for mobile users regarding approved appointments, registered complaints, and ready to pick-up certificates/documents.
3. Further, it is also recommended that a similar study may be conducted to improve the Barangay Integrated Management System with Mobile Support and the effectiveness of the presented solution.

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