ABSTRACT
The purpose of this study is to address a solution to the difficulty that has been occurring in a barangay. The idea was to introduce management information system to help solve the problem. This paper provides an efficient and effective way to record and manage information that is needed of every barangay. The Barangay Management Information System is a program which contains features that records and manages information and at the same time can send documents from barangay hall to the city hall.

Keywords

1. INTRODUCTION
In this age of advanced technologies of operation, no one is left behind from using high technologies to make works or complex activities easier. Computers, specifically, serve as a general service tools and weapon in the field of information retrieval and operations. Computer-based information retrieval operates through the use of software that can offer information services for an institution or organization. It is powerful and convenient builder for simultaneous growth in society and industries. An information service provides a way to electronically access, retrieve, and transmit that information. San Carlos City is a third class city in the province of Pangasinan. It has 86 barangays and one of these barangays is Barangay Turac. According to the 2010 census, it has a population of 175,103 people, making it the most populated city in Pangasinan and entire Region 1. It is politically subdivided into eighty-six (86) barangays.[1] Barangay Management Information System for San Carlos City is an online and offline system to keep, process, retrieve and update Barangay and City Hall information through a secure network interface. It is designed to handle a wide-range of information relating to barangay profile, constituents profile, barangay clearances, barangay disputes/cases, barangay activities, and barangay legislation and City Hall’s required reports from the barangay. It covers all the functions, activities and transactions of the barangay which aims to provide complete and accurate information for the barangay and city hall management and stakeholders.

1.1 Project Framework
An Information System is an organized combination of people, hardware, software, resources and communication networks. Information system is also a scientific study that covers strategic, managerial and operational activities. These three activities basically deal with the following operations: (1) Gathering of Information, (2) Processing of Information and (3) Storage of Information.

The framework serves as the basis of the proponents in conducting the study. This included inputs, process and output of the study as shown in Figure 1.

2. REVIEW OF RELATED LITERATURE
According to Nestor (2016), barangay represent the government at the grass root level. They are considered the epitome of what the government can offer and are the court of first help of the general populace.[2]

Henczel (n.d.) calls this as information audit, focusing on the information sources, resources, show and how information contributes to the objectives of an organization like barangay. This study is the solution to the problems stated and to enhance the quality of service a barangay office offers to its constituents.
clients. Furthermore, this serves as an awakening factor for all
government offices, from highest to lowest levels, to be in line
with the government’s view of globalization and
competitiveness in today’s information age.[3]

Dr. Peter G. Knight (n.d) in his study, The Online Information
System, can stored data, that is, its file or its database, are
usually organized in such a way that individual pieces of data
can be retrieve and for modified quickly and without
necessarily accessing any other piece of data in the system.

The effectiveness is achieved when management style is
moving to mutual participation of employers, and enhances
the organization to achieve efficiently and effectively its
services to the people.

3. PROJECT DESIGN AND
METHODOLOGY

In designing and developing the proposed system, titled
“Barangay Management Information System for Cities and
Municipalities in the Philippines”, quantitative method will
be used in the study. Quantitative research focuses on gathering
numerical data and generalizing it across groups of people or
to explain a particular phenomenon. The objective of
quantitative research is to develop and employ mathematical
models, theories and/or hypotheses pertaining to phenomena.
The proponents will employ this research method since the
study will be conducted by interview, observations, and
surveys.

The proponents analyze the design of the proposed study and
chose the appropriate methodology as the foundation of the
study. There are different types of methodologies that can be
used but the proponents will be using of a descriptive-
developmental method of research in gathering important data
on how the system is being presented and designed.

Descriptive research method is designed for the proponents to
gather information about present existing conditions needed in
the chosen field of study.

Descriptive research describes and interprets what is
concerned with conditions of relationships that exist; practices
that prevail; beliefs; processes that are going on; effects that
are being felt, or trends that are developing. The process of
descriptive research goes beyond mere gathering and
tabulation of data. It involves the elements or interpretation of
the meaning or significance of what is described. Thus
description is often combined with comparison and contrast
involving measurements, classifications, interpretation and
evaluation. [4]

3.1 Population and Locale of the Study

San Carlos City is the largest city of the province of
Pangasinan. It has a population of 175,103 people. San Carlos
City is politically subdivided into 86 barangays and Barangay
Turac is one of its barangays. The main participants of the
study are the 3 Barangay Officials and barangay workers, the
President of Liga of the Barangay and DILG head in the
municipality to have connection through implementation of
the Barangay Management Information System for Cities and
Municipalities in the Philippines. Barangay Turac is located
in the City of San Carlos, Province of Pangasinan. City hall is
situated at Palaris St., San Carlos City, Pangasinan where
documents/reports of the barangay submitted.

3.2 Data Instrumentation

The proponents will be using different data gathering tools,
which can help to gather the relevant information needed in
order to achieve the goal of the proposed study. Here are the
data gathering tools:

Observation. The method involves watching and recording the
behavior of individuals or groups, or the events that occur in
a particular place. [5] The proponents will conduct observations
to review the processes and activities involve in the barangay
and city hall.

Interview. “An interview is a procedure designed to obtain
information from a person’s oral response to oral inquiries.”
[6] The proponents will interview to gather and seek
information. The proponents will conduct interview to the
stakeholders including barangay captain, barangay workers,
and assigned employee in city hall about the processes
involved in issuing clearances and other services that the
barangay issued to its constituents and the reports submitted
by the barangay to the city hall.

Internet Research. Internet Research continues to provide an
outlet for the publication of the latest research relating to
internet technologies and applications, and their impact upon
society. It is recommended reading for academics and
practitioners alike, regularly providing material of interest and
value to both communities. [7] The proponents will gather
additional information through World Wide Web related to
the study.

Library Research. A Library research begins when you need
information to solve a problem, to fulfill an academic
assignment or for your own purposes. It is a way of getting
information by the use of books and journals (Ramsey, 2013).
The proponents will also gather data by using books for the
additional information needed in the study.

Survey Questionnaire. A very important aspect of research
work is a survey or questionnaire. A questionnaire is usually
composed of one or more questions, answered by a number of
people. Survey is the used of asking questions to the
respondents that is related to the study [8]. The proponents
will provide survey 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.

3.3 Data Analysis

The key model behind the Management Information System is
to know the System Development Life Cycle (SDLC) Model
for the development of study.

In order to create the Barangay Management Information
System for San Carlos City, the proponents followed the
appropriate rules of System Development Life Cycle (SDLC).
This will serve as a guide to the proponents in their proposed
system and its network infrastructure. Phases of the SDLC
model includes System Planning, System Analysis, System

4. PRESENTATION AND ANALYSIS OF
DATA

This method is a derivative of the traditional water fall model
but with some minor variations relative to iterations between
certain stages. In response to the perceived problems with the
pure waterfall model, modified waterfall model have been
introduced. This is the phases to overlap when needed. The
modified waterfall can also split into subproject at an
appropriate phase (such as after the hardware design and
software design).In response to the perceived problems with the
pure waterfall model, many modified waterfall models
have been introduced.
The main change is that the phases in this advanced model are permitted to overlap. Because the phases overlap, a lot of flexibility has been introduced. At the same time, a number of tasks can function concurrently, which ensures that the defects in the software are removed in the development stage itself and the overhead cost of making changes to the software before implementation is saved.

![Modified Waterfall Model](image)

**Fig 2: Modified Waterfall Model**

### 4.1 Model Comparison using the criteria
Modified waterfall model uses the same phases as the pure waterfall model. In response to the perceived problems with pure waterfall model, modified waterfall model have been introduced. This enables the phases to overlap when needed. The modified waterfall can also split into subproject at an appropriate phase (such as after the hardware design and software design). In response to the perceived problems with the pure waterfall model.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Modified Waterfall Model</th>
<th>Iterative Model</th>
<th>Spiral Model</th>
<th>V-Model</th>
<th>Rapid Application Development (RAD) Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speeding access to the applications and service</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Visibility of the stakeholders</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appropriately size and complexity of the software</th>
<th>3</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to cope with the changes</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Flexibility of the system</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Average</td>
<td>2.60</td>
<td>1.80</td>
<td>1.60</td>
<td>2.00</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Legend:
2.51 - 3.00 - Excellent
2.01 - 2.50 - Very Good
1.51 - 2.00 - Good
1.00 - 1.50 - Poor

### 4.2 Implementation and Testing Phase
This phase comes after a complete understanding of system requirements and specifications, it is the actual construction process after having a complete and illustrated design for the requested system. In this phase, the system is ready to be deployed and installed in customer’s premises, ready to become running, live and productive, training may be required for end users to make sure they know how to use the system and to get familiar with it, the implementation phase may take long time and that depends on the complexity of the system and the solution it presents [9]. During the implementation, the proponents tested the system with the barangay captain and secretary, and Liga ng mga Barangay President. The proponents implement the system in the barangay hall and Liga ng mga Barangay office. After testing the system, the proponents test the system with the barangay captain, appointed secretary, and the president of the Liga ng mga Barangay. The proponents summed up the comment of the tester.

### 4.3 Deployment Phase
After successful testing, the product is delivered / deployed to the customer for their use. As soon as the product is given to the customers, they will first do the beta testing. If any changes are required or if any bugs are caught, then they will report it in the engineering team. Once those changes are made or the bugs are fixed then the final deployment will happen. The proponents will not conduct this phase for this is beyond the scope and limitation.
4.4 Maintenance Phase
The maintenance phase involves making changes to hardware, software, and documentation to support its operational effectiveness. It includes making changes to improve a system's performance, correct problems, enhance security, or address user requirements. To ensure modifications do not disrupt operations or degrade a system's performance or security, organizations should establish appropriate change management standards and procedures. The proponents will not conduct this phase for this is beyond the scope and limitation.

5. CONCLUSION
Therefore, the proponents conclude that the Barangay Management Information System for Cities and Municipalities in the Philippines, plays a big part to make work efficient. The gathered information like stakeholders, policies, IT equipment to be used, and barangay forms and reports are necessary inputs in the conduct of the study for they are means of getting the appropriate output of the study. Policies being practiced in the barangay and city hall are important factor in the determining its integrity and authority. Proponent also relied on the policies being practice in the barangay and city hall to be able to execute it on the proposed system. Since the functionalities of the system are very important, the proponents based it on the scope of the study where sending of reports was included in the process of the system. Modified Waterfall model met the criteria given by the proponents in choosing the best model to be use in the study. After comparing it to the other modes, it has been proven that it is suitable in the proponent's study. The full functionality of the proposed system met the scope of the study and ready to be used. The results of the survey exceeded the last objective of the study, which is to provide at least 90% of acceptability of the system.

6. RECOMMENDATION
The proponents recommended that there should be a person that is computer literate to operate the system. This is important to run the system without any supervision. The proponents also encourage the stakeholders, to have further research of the same study in other places, local or foreign to verify, strengthen or contradict the findings of the study. This might be necessary so that if the findings of the study are all the same, the generalizations of wider application can be formulated. The proponents also recommend to provide their own I.T resources if they will adapt the study, in order to maintain the flow of the network infrastructure. These resources are essential to make daily operations organize and reliable.

7. REFERENCES