



An IT Consultancy Project for the City Government of Malolos- An Online Engineering Permit Module

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Abstract— *The City Government of Malolos adapt the E-governance that other City Government in the Philippines already doing. Part of this big system is the Engineering Permit Module which eliminate any problems that may occur, the Engineer's Office decided to replace the old ways of using calculators, pens, papers and less organized system for serving the people of Malolos by using an automated system that will process the applicant's projects specification as well as calculate the necessary permit price and track the status of city projects and constructions. The City Government of Malolos, particularly, the City Engineering's Office handles all city projects as well as private building constructions and infrastructures, ensuring that every structure in their beloved city must be safe for the people to occupy and enjoy the massive activities that an infrastructure can offer. Due to the increasing project constructions happen in the city premises, the City Engineering's Office is having a hard time serving the growing applicants wanting for their building to begin constructions by acquiring a permit from them. Building constructions and any projects are bounded by law, and it all applies to the municipality in the Philippines. The law make sure that building bear up with tragedies such as storms, earthquake and other natural disasters. The law must ensure that every structure within the city is safe for the people to live in. The division under the LGU (Local Government Unit) that put in force this law is the Engineering's Office. They are the ones who carefully assess the structure specification and conduct project site inspection so that safe initiation of construction is guaranteed. The Engineer's Office confers Engineering permits to the owner of the building that they have been inspected and approved of. The purpose of permit is that it gives a reasonable assertion that an infrastructure is safe from structural failure, health risks, hazards from electrical systems and the like.*

Keywords — *IT Consultancy, E-Governance, Engineering Permit, Online Module*

I. INTRODUCTION

E-governance is applying information technology for providing government services, exchange of information, integration of various systems between government to the customer, government to the business institution, and from government to government. Through e-governance, government services will be available to citizens in a convenient and efficient manner.

The information technology, nowadays, is an effective tool that is adept of processing data. It is mechanism that we use to create, retrieved, update and delete data. Being knowledgeable means having known facts, having known information. One of the most substantial influences of information technology is in to the government, as compared with corporations and private individuals. The governments are not leaders in technology. They respond to the atmosphere around them instead of trying to find new ways of productivity. People can easily adapt to the new trends and a lot of application can already be utilized by the government, and so they are forced to catch up with these changes.

II. OVERVIEW OF THE STUDY

The Engineer's Office in City Government of Malolos is the one responsible for ensuring the safety of buildings and other constructions, monitors infrastructure growth and development and be in frontline of giving quality service to the people in terms of construction needs. The Engineer's Office issues permit by patiently checking the applicant's submitted documents one by one and calculate the permit price based on the project's description and composition. The applicant must pay the fee written on an Order of Payment that the Engineer's office provide in order to begin the project construction. The Engineer's Office keeps the project information to a Log Book to manage and keep track of the ongoing projects and construction.

Due to the rapid growth and progress of the City of Malolos. The Engineer's Office is having a hard time managing the project construction and permit issuance submitted by applicants. In order to resolve the issue, the Engineer's Office decided to move from their old ways of using pen, paper and calculator for management and issuance of permit to a new automated system that will systematically tracks City projects and constructions as well as make the issuance of Building Permit fast and easy.

III. METHODOLOGY

The framework defines the underlying set of ideas, principles, agreements, or rules that provides the basis or outline for something intended to be more fully developed at a later stage. The frameworks are linked to particular research

purposes such as exploration, description, gauging, decision making and explanation/prediction when the purpose and framework are aligned with other aspects of empirical research, such as choice of methodology (survey, interviews, analysis of data, direct observation, focus groups, etc.) and type of statistical technique become obvious.

A. Conceptual Framework

The Engineering Permit Module follows the process called IPO diagram as their conceptual framework of the study which serve as a guide while study is progress. The IPO model is a general system model and is used to convey systems processes and as show in Figure 1, the first frame of the diagram is the input which refers to all the source of information required in the development and producing of the output.

The most common input includes the information from the City Engineering Office, interview, related books/thesis software requirements and other references.



Figure 1 – Conceptual Framework

Waterfall approach was first SDLC Model to be used widely in Software Engineering to ensure success of the project. In "The Waterfall" approach, the whole process of software development is divided into separate phases. In Waterfall model, typically, the outcome of one phase acts as the input for the next phase sequentially.

The waterfall model is used for the system development because it allows for departmentalization and control. A schedule can be set with deadlines for each stage of development and a product can proceed through the development process model phases one by one.

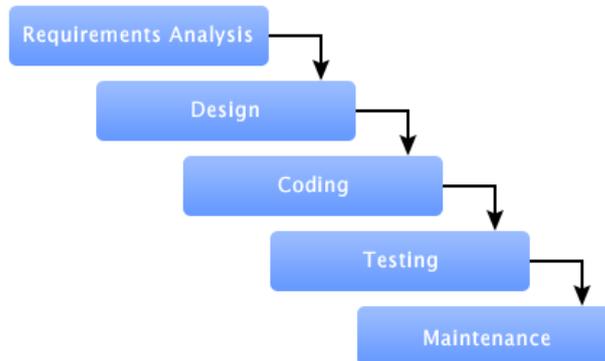


Figure 2 – Waterfall Model

B. System Development Methodology

The second frame is the processing side which involves different stages. All possible requirements of the Engineering Permit Module has been gathered by conducting an interview to the employees of City of Malolos Engineer's Office, and carefully analyses the data acquired that will be used in the next phase. In this study hardware and system requirements are specified as well as the overall system architecture of the Engineering Permit Module based on the requirements gathered in the Engineer's Office. With inputs from system design, the researcher developed the Engineering Permit Module in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

Deployment of the units in the implementation phase are integrated into the Engineering Permit Module after testing of each unit. Post integration the entire system is tested for any faults and failures. Once the functional and non-functional testing is done, the Engineering Permit Module can now be deployed to the Engineering's office. There are some issues which come up in the client environment. To fix those issues, software patches and update are released which also adds new features to the Engineering Permit Module.

C. Evaluation and Interpretation

This section presents the analysis, interpretation and implications of the summarized test results, as well as observations on the limits of the system's capabilities. It also discusses the type(s) of testing performed on the system, the test data used, and the results of the tests.

During the evaluation of the developed system, the researcher distributed questionnaires to the respondent of the system and was evaluated by a pool of two Information Technology Professor / Consultant with a handful of experience

in the IT Industry, two City Engineer's Office employees that are working for the City Government of Malolos for almost 10 years and has a lot of experience in the Engineer's Office daily transactions, and thirty Information Technology student

Table 1 Respondents of the Evaluation

Respondents	Frequency	Percentage
IT Experts	2	6%
Employees	2	6%
Students	30	88%
Total	34	100%

An instrument used to assess the operational feasibility of the system. The following criteria were provided in order to evaluate the developed system: (a) Functionality, (b) Reliability, (c) Usability, (d) Maintainability and (e) Portability, (f) Training and Documentation. The researcher used several tools in gathering data needed for the study. The following were the tools used in gathering the data.

The interpretation and presentation of the tables discuss the overall mean distribution in each of the criteria. It also shows the interpretation that ranges from Poor, Fair, Good, Very Good and Excellent as the highest interpretation of the mean distributions. The researcher devised an evaluation instrument based on the Software Quality Model following a five-point Likert scale:

Table 2 Five Point Likert Type Attitude Scale

Scale	Range	Descriptive Rating
1	1.00 – 1.49	Poor
2	1.50 – 2.49	Fair
3	2.50 – 3.49	Good
4	3.50 – 4.49	Very Good
5	4.50 – 5.00	Excellent

The rating from the respondent are treated statistically using a Likert Scale and was recorded based on the weighted mean or average. Their response to the Software Quality Evaluation Criteria such as: Functionality, Reliability, Usability, Maintainability, Portability and Training and Documentation.

There are three measurements of the central location widely used in descriptive statistics: the mean of which has its appropriate use in describing the sample or population being studied if three measurements; the weight mean, since it is more reliable in computing the data and considered to be the most stable measures of central location associated with the interval and/or ratio data provided that the distribution is normal. The weight score are with descriptive rating of 5 = "Excellent", 4 = "Very Good", 3= "Good", 2="Fair" and 1="Poor." The rating of the respondent's on the different criteria that will be computed using the mean formula.

Formula: $M = \frac{\Sigma}{N}$

Where:

- M – Mean,
- Σ - Sum of all ratings,
- N – Number of respondents

Expert's Assessment on the Functionality of the proposed Engineering Permit Module. The expert's assessments were sought using a five-point Likert Scale interpreted as follows: Excellent (5), Very Good (4), Good (3), Fair (2) and Poor (1).

Table 3 Summary of the weighted mean for Engineering Permit Module

Criteria	Score	Rating
Functionality	4.25	Very Good
Reliability	4.24	Very Good
Usability	4.30	Very Good
Maintainability	4.22	Very Good
Portability	4.15	Very Good
Training and Documentation	4.28	Very Good
General Weighted Mean	4.24	Very Good

The data reveal that the proposed system was rated “Very Good” in terms of Functionality (4.25); Reliability (4.24); Usability (4.30); Maintainability (4.22); Portability (4.15); and Training and Documentation (4.28). Comparatively lower ratings were given to the system in terms of Functionality and Portability (4.15). As a whole, the obtained mean value of 4.24 indicates the proposed system was “Very Good”, and was recommended for use in the municipality of Malolos.

D. Sample Screen Shots

Figure 3 (Employee) Application Registration Page

Applicant No.	Name	Project Name	Order of Payment	Update	Building O.R No.	Status	
2015-02-00001	Amel Alvarado	Two (2) storey building of communities bulacan inc.	Residential	Building Permit	Release	4325313	GRANTED
2015-02-00002	Noe Peneyra	Single Storey Residential		Building Permit	Release	1112222	GRANTED
2015-02-00003	Hobie Sasns	Tasdasd Residential		Building Permit	Release	12312312	DENIED
2015-02-00004	eqwe qweqwe	qrqweqw Residential		Building Permit	Release	14134	GRANTED

Figure 4 (Employee) Building Permit Applicants

Figure 5 (Employee) Generated Certificate of Occupancy

Applicant No.	Owner	Project Name	Status	Total Assessment
2014-11-00001	Santos, Hobile, Santos	Project Two Stories	GRANTED	3230.2
2014-11-00002	Time, Its, Coffe	10 stories Building	GRANTED	9395.13
2014-11-00003	Rare, Arcana, Legendary	Mythical House	DENIED	5563.12
2014-11-00004	Sucker, Magic, Power	Maze House	GRANTED	10375
2014-11-00005	Wticher, Witch, Witch	Candy House	DENIED	284431
2015-01-00006	Jun, Jan, Jin	New Year Bld	GRANTED	132538
2015-01-00007	Dela Cruz, Froilan Ross, Lopez	Icarus	DENIED	122684
				Total : 568216.45

Figure 6 (Employee) Generated Summary of Applicants Report Page

IV. CONCLUSIONS

This section gives an assessment of what happened in this project. It presents explanations and justifications on how the objectives of the project were met, to what extent and why some objectives were not met. This section also includes a discussion of possible improvements that can be made on the software, as well as future directions of the project in general. This serves as a springboard for projects that may be done by future project researcher.

Based on the findings of the study, the following conclusions were drawn: 1.) The City of Malolos Engineer's Office, can greatly utilized the features and functions provided by the Engineering Permit Module for handling their daily transactions. 2.) The Engineer's Office can easily procure the necessary hardware and software requirements that the Engineering Permit Module due to its low cost and easy to maintain. 3.) Based on the evaluation, the Engineer's Office determine that the Engineering Permit Module has the following significant features: Functionality; Reliability; Usability; Maintainability; Portability, and Training and Documentation. 4.) The waterfall model may be effectively used in developing the Engineering Permit Module

Based on the aforementioned conclusions, the following recommendations are hereby presented: 1.) Printing documents such as Order of Payment must have a digital signature like a Bar Code or an NFC tag to make sure that the documents is only provided by the City of Malolos Engineer's Office. 2.) Implement Content Management System for management of Permit Requirements to adapt the changes in the Law and Constitution.

ACKNOWLEDGMENT

The researcher wishes to express their gratitude to all the people who have given their over whelming support in making this project possible. Thank you to Bulacan State University and to the College of Information and Communications Technology for the encouragement and assistance to its faculty and staff. To the Municipality of Malolos especially to all the staff of Mayor's office for providing us pertinent data that have been used for the completion of this project. Lastly, the researcher would like to thank Hobbie G. Santos and Froilan Ross L. dela Cruz for the system development of this project.

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