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PHIVOLCS Project Management System

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Abstract: Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives. The core components of Project Management includes why a project is necessary, preparing a business case to justify the investment, managing the risks, issues and changes, maintaining communication and closing the project (APM, 2015).

This paper aims to improve the Project Management of Philippine Institute of Volcanology and Seismology (PHIVOLCS), a government organization that is a service institute of Department of Science and Technology (DOST) that is mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami and other related geotectonic phenomena (PHIVOLCS, 2008).

In order to improve the Project Management of PHIVOLCS, the developers have created a Project Management System. The system is web-based where the clients can access it anywhere provided that a computer with internet is available. The system provides easier project proposals where it can guide the clients in stating a proposal, helping them build a project team through it, monitoring the project during the execution, and closing the project. The system also archives and records previous projects which can be easily used as a basis for other future projects.

Key Words: ICT; Project Management System; Portfolio Management; Resource Management

1. INTRODUCTION

Nearly all organizations conduct projects on a regular basis. Projects help further the organization's goals and objectives, usually in the form of products or services or in terms of improving the organization's current activities in one or more aspects. When an organization experiences growth, however, a larger number of projects usually follow. Difficulties in managing the projects and its resources will inevitably arise as more and more projects are necessitated from the organization's activities. This is normally where project management information systems help greatly.

This study will involve the creation of an information system under the concept of project management. A project is defined as a unique set of activities with defined beginnings and ends, conducted by an individual, team, or organization, to meet specific objectives based on defined requirements (Lester, 2007). The act of project management is defined as controlling and monitoring the set of activities and resources used within a project (Chatfield, 2007) For this study, the proponents will use the traditional five process groups to define the project management process: *initiation, planning, execution, monitoring and controlling,* and *closure* (Wysocki, 2006).

A project management system is an information system that helps an organization track and manage projects. This type of information system seeks to increase the efficiency and timeliness of projects undertaken in an organization, as well as simplify the management of resources that these projects use (Gido & Clements, 2009).

The proponents of this study will create a project management system for the Philippine Institute of Volcanology and Seismology, bound by these definitions. Knowing that the areas that PHIVOLCS' scientific divisions work on can be sensitive to activities that use heavy equipment, it is important for them to know whether such hazards may be present or not. This is where geographical dependency detection comes in. Geographical dependencies refer to where the division chiefs and project members study and mark the areas where accidents might happen if different areas are to be drilled, excavated or have heavy equipment to use on. The system will include warnings in the project details should these dependencies apply. In addition, this can be extended to the equipment used by the project proponents. For example, if the researchers discover that an area is in critical danger (i.e. active volcano showing signs of eruption in the very near future), certain equipment may become vital to have onsite. The system will allow users to lock equipment to these critical areas, thereby disallowing others from moving the equipment to other areas with less priority, until such time that the situation has either passed or calmed down entirely. The critical area markings and priorities will be determined by the researchers themselves through the system.

Their existing system had several problems that limited the employees in providing efficient ways in proposing new projects for PHIVOLCS. The task of the team was to study and analyze workflow of the different divisions of PHIVOLCS, to gather sufficient information regarding the project management cycle of the organization, and to provide relevant project information to decision-makers such as the division chiefs and directors in order to aid good decision-making. With this, the challenge of the team was to identify the problems related to the organization's current processes and provide them an information system that will help them solve these problems.

One problem is that the existing project management methods is paper-based, which is time-consuming and hard to use as reference material for future projects. Another problem identified is the gaps in project progress monitoring. Thirdly, there was a lack of quantitative methods used in resource and workload allocation. Finally, tracking of materials and equipment (in terms of location and status) was difficult due to traditional methods such as email and phone calls.

2. METHODOLOGY

The team decided to use Rapid Application Development (RAD) as a methodology in developing the project because the team believes that RAD is a development lifecycle designed to give much faster development and higher-quality results that those achieved with the traditional lifecycle. RAD also reduces cost and increases quality in system development. RAD is essential when the project data scope's business objectives are well defined and narrow. It has four essential aspects: methodology, people, management, and tools. The phases included in RAD are Requirements Planning, User Design, Construction, and Cutover.

2.1 Requirements Planning

In this phase, the team had meetings with the client in order to gather data and the business requirements that are needed for the project. The project scope is also defined and clarified with the client in this phase. The functions and modules that are supported in the system are plotted after defining the business requirements.

2.2 User Design

In this phase, the team developed a prototype of the system and invited users to interact with the developed prototype. After the users' interaction with the prototype, the

team was provided with feedback from the users in order to know which parts of the prototype should be improved. This phase helped the users understand what system will be developed.

2.3 Construction

The developers of the team finalized the design and built the entire system. In this phase, the users will reviewed the software implementation that was developed by the team members.

2.4 Cutover

In the final phase of RAD, the team performed system testing and assessment of the project. Since this is a CAPSTONE project developed by students, the assessment of the project was done by having a thesis defense with a panel. The assessment of the panel is presented as revisions. The revisions are done by modifying the specific parts of the project as per the comments by the panel members.

3. RESULTS & DISCUSSION

The group's conceptual framework is composed of four major modules for the proposed project management information system. The system will have four users: the director of PHIVOLCS, the different chiefs of each of the five divisions, the members of the project teams (employees of divisions), and the employees in the budget section under the FAD. Below is the image of the group's conceptual framework:

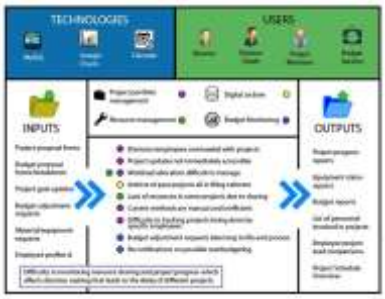

Figure 1.0 Conceptual Framework

3.1 Portfolio Management

The first module is the project portfolio management module, which is responsible for keeping track of all projects currently being done by PHIVOLCS. This module also contains profiles of employees involved in projects, which includes a list of projects being handled by a specific employee when their profiles are viewed. Regular project progress updates will be one of the inputs in this module, which will allow project proponents, division chiefs, and the director himself to check on the progress of ongoing projects. This module will also directly assist project heads in allocating workload across employees by creating comparisons between two employees and how many projects the two employees are currently handling. Should offloading of projects be required in order to reduce work overload on a particular employee, the system will suggest to whom the projects should be transferred to, based on an employee's skill set (displayed as information on their employee profile) and current project load. The mechanism for staff recommendation for projects will require the use of tags and keyword matching.

For example, a project placed in the system will have tags such as "hazard mapping" and "volcanology", which the system will match with tags on division members with skills related to the project's tags. Should there be an instance where a project requires skills that have yet to be registered as tags within the system, the user placing this new project should create the tags as necessary. The system will then detect that the tags are new and will alert all users viewing the new project that it is a "special skills" project so that project proponents will know whether it is necessary to outsource project tasks to specialists outside of PHIVOLCS, or perhaps for the proponents themselves to recommend specific personnel on their own. Finally, this module comes with a calendar/scheduler that provides division chiefs and project heads with a convenient way to place project durations, goals and deadlines in an easy to access overview format. The scheduler will also include a Gantt chart generator, considering that the project teams use Gantt charts to lay out project schedules.

Figure 2.0 Project Portfolio List

3.2 Resource Management

Resource Management, the second module is responsible for keeping track of manpower, materials, and equipment used in PHIVOLCS' projects. Monitoring the movement of these resources around the organization's projects as well as monitoring the sharing of resources is key to preventing conflicts between the use of project resources, which is one of the primary causes of delays in projects (especially projects that require special equipment in order to push through).

Figure 3.0 Inventory and Equipment Status

3.3 Budget Monitoring

The third module in the system is the budget monitoring module, which provides a link between the five divisions and the budget section under the Finance and Administrative Division. This module will take budget reports from the different project teams and weigh them against their projects' proposed budgets (as laid out in the planning phase of the project management cycle). This then allows the system to alert the proponents and the budget section about any projects that might go over budget. Finally, this module allows project heads to request additional funds to be placed in the project's budget in case the need arises (e.g. additional materials, equipment, etc). The PMBOK Guide, Fifth Edition describes the "To-Complete Performance Index" (TCPI) model used for project cost management & control. The TCPI is described as "the calculated cost performance index that is achieved on the remaining work to meet the specified management goal, such as the BAC (initial approved budget) or the EAC (estimate at completion of project/new approved budget)". It is computed as follows: TCPI = (remaining work) ÷ (remaining funds), where remaining work is the BAC minus the earned value (EV). In case a project goes over budget, the cost baseline will need to be updated, then the actual cost (AC) incurred to date will be subtracted from the EAC (PMI, 2013). The system will adhere to this concept in order to determine how much better a project's cost performance must be. The forecasting of a project possibly going over budget is done by examining the work already completed to date and weighing it against the initial budget and the amount of budget already spent on the project itself. For example, a project six months in might have a $60,000 expenditure total, with the progress at about 40% of the total work done and total cost of $100,000. First you find the Earned Value (EV) by getting 40% of Budget at Completion (BAC) which is $100,000 which now gives you $40,000 for the EV. Next is getting the Cost Performance Index (CPI) by dividing EV by the Actual Cost (AC). CPI= EV/AC, 40,000/60,000, which would give a value of 0.67 for the CPI. The Estimate at Completion (EAC) is taken by dividing the BAC by the CPI. EAC=BAC/CPI, 100,000/0.67, which would give a value of $149,253.73 for the EAC. The CPI we got is only 0.67 which is less than 1 so that indicates the project is already over-budget so we now need to get the To Complete Performance Index (TCPI). The formula for getting the TCPI is (BAC-EV)/(EAC-AC), which gives you a value of 0.67 for the TCPI. The project members should go with a CPI of 0.67 to complete the project, meaning, project proponents must be more efficient with their cost performance for the rest of the project.

Figure 4.0 Budget Forecasting

3.4 Digital Project Archive

The final module is the digital project archive, which holds all previously completed projects. This module helps solve the problem of having project reports and old project proposal forms in paper form, which makes it difficult to retrace them. This hampers decision-making when it comes to new projects in areas that PHIVOLCS has not yet covered, coming up with projects under new concepts, or simply using previous projects as references. The digital project archive will allow users to easily search for previous projects without having to physically take the files out of the organization's filing cabinets.

Figure 5.0 End of Project Summary Report

4 CONCLUSION

At the end of the project management system development process, the team was able to complete the proposed system as far as the process in the organization's project management cycle is concerned. From the initiation and proposal of a project, all the way to the monitoring and execution and the closure of the project itself, modules were implemented the system. After initial testing and revisions to the different modules, user acceptance testing was conducted in order to ascertain the effectiveness of the system in a real world environment.

The team was able to learn how best to handle the different requirements of the organization with regards to the project management cycle. Interviewing the personnel typically involved in PHIVOLCS' projects allowed the team to gather information and testimony, and in turn this information was used in order to make adjustments to the system to suit the organization's needs. User acceptance testing also helped in this regard. A test was administered in order to receive unbiased feedback from those to whom the system would be turned over after development is completed. The initial results were tallied in order to see which modules were working as intended, and which modules had significant bugs and/or glitches that hampered the project management cycle in the system itself. For example, if the initial results had answers that point to a faulty module, that module's code and functionality would be examined and corrected accordingly.

Through the implementation of the new system, the team believes that most of the organization's problems will be resolved; resource allocation, assignment of members to projects, map plotting, and budget monitoring. The organization can now make project proposals easily because all the forms that are used for this purpose may now be found in one system, allowing for easy access and completion. The new system also improves how the organization can browse through past records, as archives can be easily accessed when they are needed for reference compared to the existing system, which stores hard copies in filing cabinets.

The team recommends that the organization should conduct training for the individuals who would operate the system. These individuals should be taught the standard operating procedure of the system and each trainee should be evaluated and be assessed properly on the grounds of how they understood and how they executed the system, to ensure and avoid any future system crashing or confusion that may arise once the system is implemented.

The team also recommends that any future studies conducted within the same topic (project management systems) look into the To-Complete Performance Index, or similar budget monitoring models. The TCPI can be used for this purpose, but the team believes that the concept bears further study. There are also other computation indices used in project management (such as the Schedule Performance Index or SPI), which the team also recommends for further study.

Finally, the team recommends examining the different project management systems. These existing systems can be used as a baseline for future development projects, as they have tried and tested features and modules that are typically suited for general project management processes.

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