

Project Monitoring with Decision Support System for the University Infrastructure Development Office

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Abstract. This research project employed the Agile Software Development Methodology to develop an Online Project Monitoring System that can be used by the university in the infrastructure development section to give them a much more organized project tracking, reviewing and regulating the progress in order to meet the performance objectives of each project across the university. The system aims to help the institution to digitize the printed records of projects in the university in an organized manner and stored securely in a database system. The researcher adapted the ISO/IEC 25010 criteria as an evaluation tool to assess the system's functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

The assessment and evaluation results of the system indicates that the PMDSS passed and conformed with the standard software quality requirements and met all the end-users' expectation and objectives that will greatly help them in monitoring of projects and making them more productive. This proves that the system can improve the management of running projects across the university and decision making of the Infrastructure Development Office.

Keywords: Database system; Development; Infrastructure; Project management; Project monitoring

1. Introduction

In any organization or institution, there is always a phase of project planning that normally follows major stages such as Project's Initiation, Planning, Production, Monitoring, and lastly, Closing. Both planning and monitoring are very important for project management and complement one another. Handling and monitoring of project documents are not easy, especially if done manually. Like the traditional way, it is tedious and prone to human error.

Currently, the Institution still has some parts in the system where it uses the traditional way of manually keeping the records of each project such as printed copy. As we all know the risk of having a permanent file document that is being produced as hard copy can be vulnerable to fire, flood, insects and so much more where we cannot retrieve those important files in case of those unexpected situations.

These problems can be solved by automating them through the use of a well-designed project monitoring system. Project Monitoring System is designed to help the Project Manager to track and monitor the projects running in the university and its off-campus. Each department has its on-going projects, some have multiple projects running and managing those is not an easy job.

Project plans and design can be accessed in the system by an authorized personnel of NEUST including the Project Manager from IDO, Administrator and Executive personnel of the university. This will benefit the users, especially the personnel from the other campus of NEUST that is far from the IDO where they can get a document copy of their approved project without the hassle and time-consuming travel.

But what does a Project Monitoring System actually mean? A Project Monitoring System (PMS) is a tool which enables monitoring and management of projects within the scope of each project. It tracks and monitors activities and tasks ensuring the effectiveness of each project. Each running project can be updated monthly by the IDO department by updating its record and uploading a photo as proof of progress of each project.

This research project will be conducted to develop an Online Project Monitoring System that can be used by the university where it can provide help to the personnel especially in the infrastructure development section giving them a much more organized project tracking, reviewing and regulating the progress in order to meet the performance objectives of each project across the university.

The system aims to help the institution to digitize the printed records of projects in the university in an organized manner so that each requesting department can request a copy of their record faster than the traditional way, making their work at ease. Having a permanent file document that is being stored in a secured database system can give the IDO personnel a peace of mind because

it can prevent unexpected situations like fire, flood, insects and so much more where we cannot tell where and when it will occur.

A Web-based Monitoring and Evaluation System for Government Projects in Tanzania: The Case of Ministry of Health

Monitoring and evaluation systems are used by organizations or governments to measure, track progress, and evaluate the outcomes of projects. Organizations can improve their performance, effectiveness, and achieve results in project success by strengthening their monitoring and evaluation systems. Moreover, various studies reveal the need for information and communication technology systems in monitoring and evaluation activities. Despite the advantage of the tools, most organizations do not employ computerized monitoring and evaluation systems due to their cost and limited expertise whereas those having these systems lack a systematic alert mechanism of the projects' progress. Currently, the Ministry of Health, Community Development, Gender, Elderly, and Children of Tanzania monitors and evaluates its projects manually facing the risks and consequences of delayed project completeness. In this study, the evolutionary prototyping approach was used to develop the proposed system. This study describes the development of a web-based monitoring and evaluation system that aims to solve the monitoring and evaluation challenges, simplify works, generate quality data, and provide timely successful project implementation. The developed system was tested and evaluated against the user's requirements and was positively accepted to be deployed at the Ministry of Health.

Project Progress Monitoring System

This project addresses the study and development of a Project Progress Monitoring System to enable users, both the operators and the customers to check the progress of their projects online and act as an operation tool for estate operators to operate their organization effectively. Traditionally, Project Progress Monitoring has been done by physically moving to the site of construction, however, today it has evolved with the rapid expansion of e-commerce. Thus, prior to developing the system, this research critically assesses and studies the reason behind the evolution and the current e-project progress monitoring systems. This project also addresses the problems faced by customers and site operators especially on project progress monitoring process, inconveniences caused to move to the sites to see how far their projects have gone. The research

studies some issues on implementation and also recommendations on how Project Progress Monitoring System can work effectively.

2. Methodology

This study will be using mixed methods research specifically sequential exploratory design which has a two-phase design where qualitative data is collected and analyzed first, then quantitative data is collected and analyzed again. The qualitative data is gathered in a form of an interview about the procedures of the existing system and problems encountered. The quantitative approach is about the data collection in a form of a survey, to evaluate whether the developed system is fitted the needs of the office as stated in the qualitative data. Mixed methods research integrates or combines rigorous quantitative and qualitative research methods to draw on the strengths of each. This also includes development, requirements gathering, and evaluation.

Requirements gathering is the process of determining what your projects need to achieve and what needs to be created to make it happen that can also be the basis of the system development. Research evaluation is an interdisciplinary peer-reviewed research. Its subject matter is the evaluation of activities concerned with scientific research, technological development and innovation.

2.1. Sampling Procedure

The researcher used purposive sampling specifically the expert sampling. Expert sampling is where researchers select their sample from experts in the field they are studying especially knowledgeable about a topic and are willing to share their knowledge. It is used when they need the opinions or assessment of people with a high degree of knowledge about the study area (Frey, 2018). Thus, the developed System will be evaluated based on the ISO/IEC 25010 Software Product Quality Standards properly, the researcher utilized one (1) Senior Full Stack Developer, two (2) Senior Server Administrator, one (1) Mid-Level Full Stack Developer, and one (1) Junior Full Stack Developer .

The researcher will also use purposive sampling in selecting the end-users which are the people in the IDO office including the IDO Director, two (2) Technical Assistant, and two (2) Admin Staff. Purposive sampling is a non-probability sample that is selected based on characteristics of a population and the objective of the study (Crossman, 2020).

2.2. Respondents

This section discusses the different respondents to be involved in assessing the usability and users' acceptability to the system. The respondents are (1) Senior Full Stack Developer, (2) Senior Server Administrator, (1) Mid-Level Full Stack Developer, (1) Junior Full Stack Developer, (1) IDO Director, (2) Technical Assistant, and (2) Admin Staff from selected offices such as the MIS and the Infrastructure and Development Office. Table 1 shows the distribution of the respondents.

IT Experts

IT Experts who will be assessing the usability of the system are Senior Full Stack Developer, Senior Server Administrator, Mid-Level Full Stack Developer, and Junior Full Stack Developer. The system will be tested to check if there are any bugs or functionality that needs improvement.

End Users

Respondents from the IDO Office who will be using the project monitoring system are the IDO Director, Technical Assistant, and Admin Staff.

Table 1. Distribution of Respondents

Respondents	Number of Respondents
Senior Full Stack Developer	1
Senior Server Administrator	2
Mid-Level Full Stack Developer	1
Junior Full Stack Developer	1
IDO Director	1
Technical Assistant	2
Admin Staff	2

2.2.1 Research Site

The study will be conducted at the Nueva Ecija University of Science and Technology (NEUST). The University is a government funded institution of higher education located in Cabanatuan City, Nueva Ecija. The institution offers undergraduate, graduate, and short-term courses that ensures the provision of

advance and professional training in art, science, and technology education that produces professionals in their field of specialization. Infrastructure Development Office (IDO) specializes in managing and monitoring universities on-going projects such as construction, repair, renovation and rehabilitation of buildings, rooms and other physical facilities from all of its Satellite Campus, excluding NEUST’s Off-campus.

Figure 1. NEUST



3. Results and Discussion

3.1. Evaluation of IT Experts

The researcher/developer presented the Project Monitoring with Decision Support System to IT Experts that has experience in various system applications. The meeting was held at Nueva Ecija University of Science and Technology on MIS Department. Right after the system presentation, IT Experts assessed the Project Monitoring with Decision Support System using ISO 25010 evaluation form.

Table 2. Summary of Evaluation of IT Experts

Software Product Quality Categories	Weighted Mean	Verbal Description
1. Functional Suitability	3.93	Highly Functional
2. Performance Efficiency	4.00	Highly Efficient
3. Compatibility	3.70	Highly Compatible
4. Usability	3.90	Highly Usable
5. Reliability	3.85	Highly Reliable
6. Security	4.00	Highly Secure
7. Maintainability	3.88	Highly Maintainable
8. Portability	4.00	Highly Portable
Average Weighted Mean	3.91	Excellent

The results of the evaluation showed that the Project Monitoring with Decision Support System follows the different software quality criteria of the ISO 25010 Software Product Quality Standards. The results proved and revealed that the developed system is a high-end product to be implemented by IDO to manage their projects running across the university.

The gathered scores of the developed system undeniably met the product quality standards free from vulnerabilities. The average weighted mean score of 3.91 given by the IT experts proved that the system passed all the criteria of the ISO 25010 as the system was graded as Highly Functional, Highly Efficient, Highly Compatible, Highly Usable, Highly Reliable, Highly Secure, Highly Maintainable and Highly Portable by the IT experts.

The scores and results of the IT expert's evaluation showed the evidence that the system can be used since no or minimal problems arose as it passed and exceeded the Software Product Quality from the ISO 25010. Moreover, IT expert's assessment and evaluation clearly established a trustworthy conclusion.

As for IT Experts, they said that the IDO of the university is currently using the manual or traditional way of monitoring of each project and the Project Monitoring System with Decision Support System will be a great help to the main beneficiary of the system as it will turn the traditional monitoring to a digital and much secure system. Making them more efficient in other matters of their office.

3.2. Evaluation of End-Users

After the system has been completed and developed, the Project Monitoring with Decision Support System was subjected to assessment system end-users (IDO Director and Staff). The IDO Director and the four (4) IDO Staff in accordance to the functional characteristics of a software product based on ISO 25010.

The Project Monitoring with Decision Support System was presented to the End-Users from IDO that will be the beneficiary of the system. The assessment was held at IDO Department of NEUST Sumacab Campus. Right after the system presentation, IDO Staff assessed the Project Monitoring with Decision Support System using ISO 25010 evaluation form.

Table 3. Summary of Evaluation of End-Users

Software Product Quality Categories	Weighted Mean	Verbal Description
1. Functional Suitability	3.73	Highly Functional
2. Usability	3.90	Highly Usable
3. Portability	3.40	Highly Portable
Average Weighted Mean	3.67	Excellent

The results of the evaluation showed that the Project Monitoring with Decision Support System is ready to be part of IDO. Evident with its verbal ratings of Highly Functional, Highly Usable and Highly Portable by the end-users, where they found the system to be a remarkable tool that they can be utilized to process the monitoring of projects running in the university.

The Project Monitoring with Decision Support System will greatly improve efficiency and effectiveness of the IDO, making the end-users more productive in other matters.

4. Conclusions

Based on the findings, the following conclusions were listed:

1. The Project Monitoring with Decision Support System (PMDSS) for University Infrastructure Development Office was successfully developed in accordance with the Agile Development Model. The system was developed based on different stages of the Agile Development Methodology.
2. The presentation of the developed system helped the IT Experts in the assessment and evaluation of the system. IT Experts conclude that the developed Project Monitoring with Decision Support System can help improve the management of running projects across the university and decision making of the Infrastructure Development Office.
3. The features and functionalities of the developed system can be very helpful in monitoring of on-going projects in the university. It can effectively add a new project, update every projects, generate reports, and upload necessary files to every projects. Such features and functions were identified to be helpful for the office.

4. The PMDSS became helpful for the IDO Director and Staff in decision making, managing and organizing the projects across the university. The system passed the evaluation of the system users based on the ISO 25010 Software Product Quality Standard. They agreed that the goals and objectives of their office has been met by the system.

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