Development and Evaluation of a Web-based Management Information System for a Planning unit of a State University in the Philippines

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AbstractThis study aimed to developed and evaluate a web-based management information system for the planning department of Eastern Samar State University. A software development methodology called Rapid Application development (RAD) were used in the development of an IT solution to the existing problem encountered in the planning unit of a university. ISO 9126 software quality standard was adapted in this study to evaluate the software. Based on the result of the evaluation conducted by the experts and end-users, the system got an over-all rating of 4.51 interpreted as strongly acceptable. It is recommended that the web-based management information system must be used or adopted by the planning unit of Eastern Samar State University.

Keywords: Management Information System, Web-based, MIS, Rapid Application Development, RAD

Background/Objectives:

[1]The COVID-19 pandemic has created a severe disruption to the education sector not only in the Philippines but globally. [2] [3]This pandemic has brought many organization to undergo significant changes which lead to the adoption of technology in the deferent key process of the organization. Using Information technology has been essential for Universities to succeed in today's dynamic and fast-paced environment. An efficient and well-designed management system is crucial to the smooth operation of an organization. It provides structure, direction and control.

[4]Management information systems are a collection of processes, tools and strategies interconnected that help with planning, organizing and leading an organization. In today's society there is an increasing growth of online software as a service and the increasing number of cloud computing or software that runs over the internet. Management systems provide a framework to guide managers in decision-making, resource management, and performance evaluation. They enable

them to efficiently use available resources, and guide their team towards achieving strategic goals. [5] Information Technology involvement such as using an MIS has a significant positive effect towards the decision making of the managers of an organization.

This is a perennial problem in Eastern Samar State University (ESSU). The absence of a computer in the planning office of the organization can cause several challenges, including those that affect productivity, efficiency and communication. Without a computer system, the office faced difficulty in managing information, collaborating efficiently, and adapting themselves to the technological demands of today's educational institutions. It is important for the university to understand these issues in order to evaluate the possible consequences, and then consider implementing a system or exploring other solutions to overcome the limitations that they face. This is why the researcher designed a web-based information system for this office.[6]Therefore, amanagement information system is needed by an organization so that the work carried out becomes effective and efficient because of an aid of a software.

Objectives of the Study

This study aimed to develop and evaluate a web-based management information system for the planning department of Eastern Samar State University:

Specifically this study aimed to:

1. Monitor the submission of the following:
   a. President's Report data
   b. Budget Execution Documents
   c. Office Performance Commitment and Review Form
   d. Department Performance Commitment and Review Form
   e. Higher Education Management Information System data
   f. Eastern Visayas RPMS data
   g. Performance based bonus data
   h. SUC levelling data
2. Create a statistical graph (line/bar) based on the submitted data
3. Create reports on the following:
   a. President's Report data
   b. Budget Execution Documents
   c. Office Performance Commitment and Review Form
   d. Department Performance Commitment and Review Form
   e. Higher Education Management Information System data
   f. Eastern Visayas RPMS data
   g. Performance based bonus data
   h. SUC levelling data
4. Using ISO 9126 quality model, evaluate the integrated system based on the following parameters:
   a. Functionality
   b. Reliability
   c. Usability
   d. Efficiency
   e. Maintainability

Methods/Statistical analysis:.

Software Development Methodology

[7][8][9]According to Kendall and kendall (2022) as cited by Naz and Khan (2015), Daud et.al (2010) and Lapada (2019) Rapid Application Development (RAD) is an object-oriented approach to systems cycle that includes a method of development as well as software tools. The researcher used RAD because this method allows the researcher to create multiple iteration and updated to ensure that the system without starting from scratch and making sure that the software is error-free and polished based on the customer's requirement as depicted in figure 1.

Instrumentation

[10][11]Theinstrument used to evaluate the system was the questionnairebased on ISO 9126 standards. ISO 9126 serves as a framework or model for providing worldwide standard software qualities required for software evaluation. Under this standard, software must possess 5 main qualities namely:Functionality,Reliability, Usability, Efficiency and Maintainability .Using the ISO 9126 for derivation of system requirements brings clarity of definition of purpose and operating capability.

The respondents of the study were the experts and the end-user of the web-based system. The researcher presented the system to experts in the field of information technology specifically in software development and to the Institutional Planning and development office of the University, the end-user of the developed software. Both type of users evaluated the system using ISO 9126 quality model instrument for software.

Data Analysis

The descriptive statistics using the mean, frequency and percentage was employed to present the demographic characteristics of the respondents and level of the system effectiveness.

Mean

This is the average of the scores – the mathematical center of a distribution. It used symmetrical, unimodal distributions of interval or ration scores. The formula for mean is:

Where:

Σx = sum of all scores

n = number of scores

Percentage

It defines as the part of expressed in hundredths. The formula for percentage is:

P = (n/t) x 100

Where:

P = percentage   n = number

t = total number of respondents

Frequency count

Frequency Count allows users to specify the binning parameters "from Minimum to Maximum", and the step by increment or interval number. The tool will provide some reference value of the minimum, maximum, and step.

Coding scheme

The system was evaluated using the following scale:

5 – Strongly Agree

4 – Agree

3 – Slightly Agree

2 – Disagree

1 – Strongly Disagree

The obtained mean was interpreted using the following:

Numerical Rating Scale   **Adjectival Rating**

4.50 – 5.00   Strongly Acceptable

3.50 – 4.49   Acceptable

2.50 – 3.49   Slightly Acceptable

1.50 – 2.49   Unacceptable

1.00 – 1.49   Strongly Unacceptable

Findings:
    Experts and end-users evaluated the system using the adopted questionnaire based on ISO 9126 quality model to evaluate the performance on functionality, reliability, usability, efficiency and maintainability. Table 1 summaries the result of the evaluation of the web-based planning management system.

        The over-all rating of **4.51** interpreted as **strongly acceptable**. This is based on the evaluation on the parameters Functionality, Reliability, and Maintainability in which ratings were interpreted as Strongly **Acceptable** while the remaining parameters Efficiency and Usability were rated as **Acceptable**. Based on the overall mean the system performance and quality is strongly acceptable for the expert and end-users of the system which further means that the system adhered to the quality standards of ISO 9126 quality model for software development.

Conclusion

The researcher were able to meet the objectives and user requirements by successfully developing and integrating the following components and modules:

1. A system that will monitor the submission of the following:

    a. President's Report data
    b. Budget Execution Documents
    c. Office Performance Commitment and Review Form
    d. Department Performance Commitment and Review Form
    e. Higher Education Management Information System data
    f. Eastern Visayas RPMS data
    g. Performance based bonus data
    h. SUC levelling data

2. An integrated module that create a statistical graph (line/bar) based on the submitted data
3. An integrated module that create reports on the following:
    a. President's Report data
    b. Budget Execution Documents
    c. Office Performance Commitment and Review Form
    d. Department Performance Commitment and Review Form
    e. Higher Education Management Information System data
    f. Eastern Visayas RPMS data
    g. Performance based bonus data
    h. SUC levelling data

4. The software expert testing and end-user testing resulted to a grand mean of 4.51 interpreted as Strongly Acceptable. This means that the system is in consonance to the software quality standards of ISO 9126.

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Figures

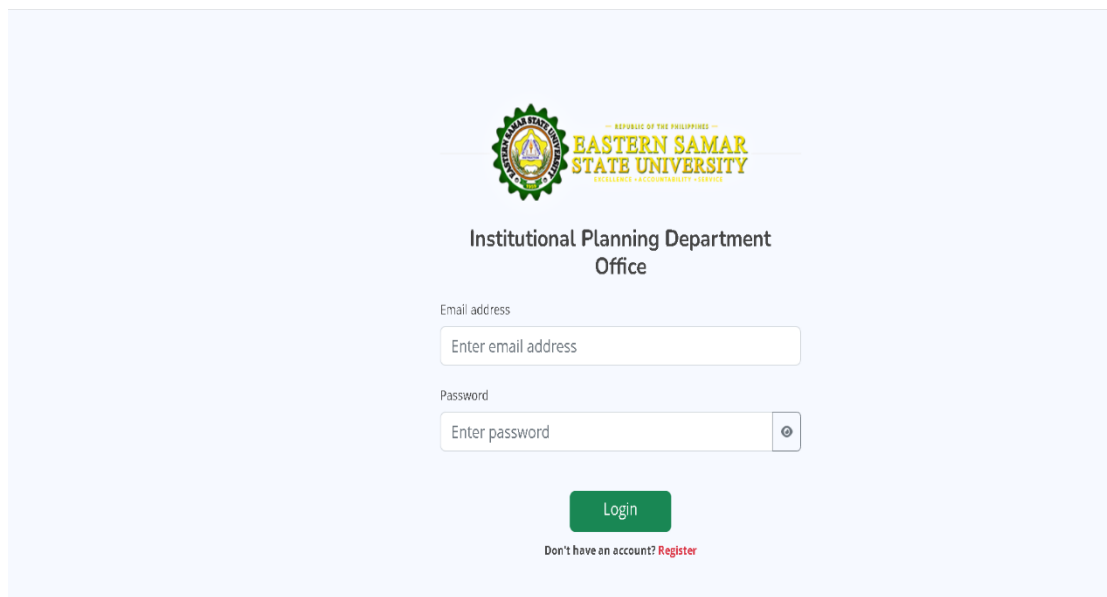Figure 1. Rapid Application Development

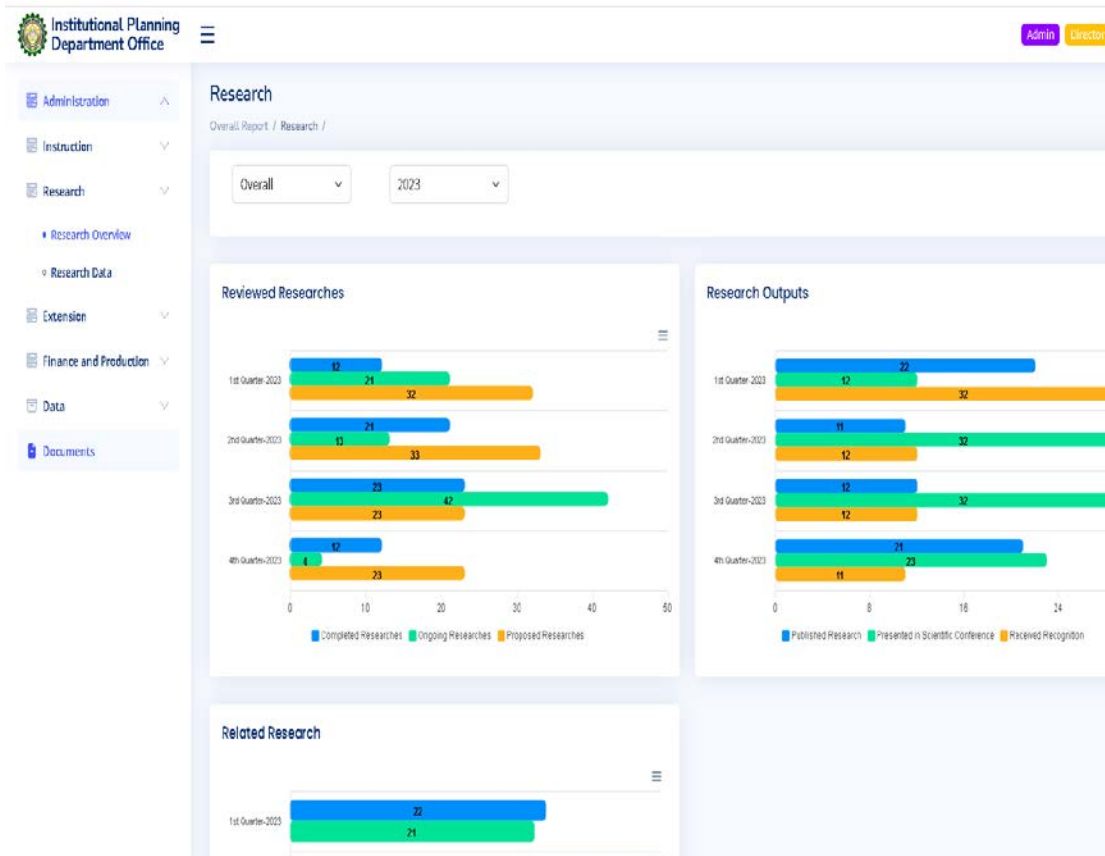Figure 2. log-in page of the web-based management information system

Figure 3. Status of submission and statistical graph based on the submitted data on research
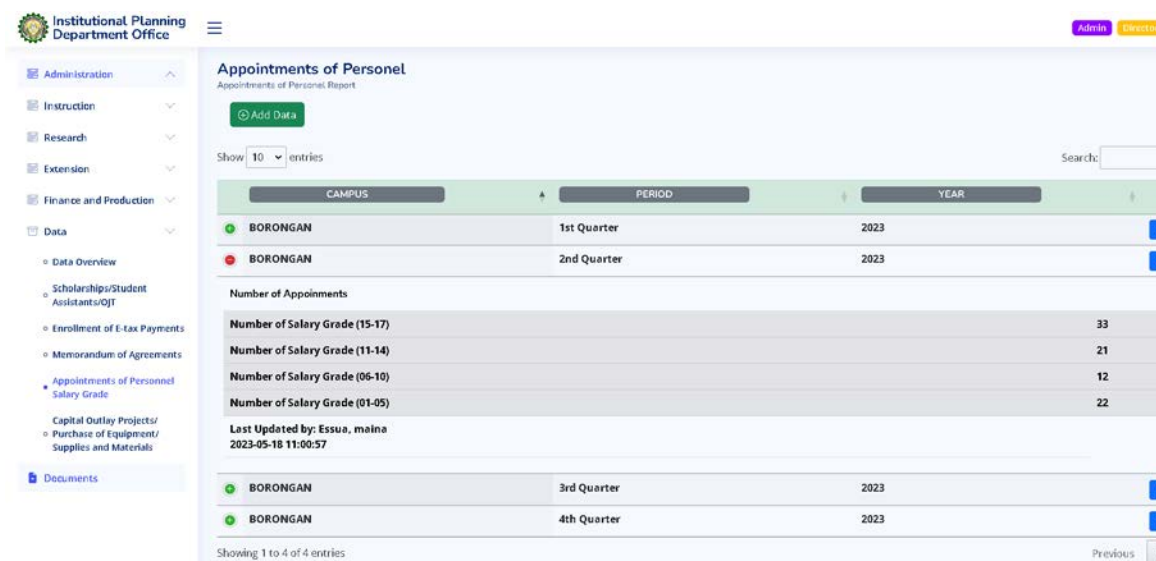

Figure 4. Status of submission and statistical graph based on the submitted data on appointment of personnel

Figure 5. Status of submission of statistical graph based on the submitted data on administration

Tables

Table 1. Result of expert and end-user testing

Parameters	Mean	Interpretation
Functionality	4.66	Strongly Acceptable
Reliability	4.59	Strongly Acceptable
Usability	4.36	Acceptable
Efficiency	4.22	Acceptable
Maintainability	4.75	Strongly Acceptable
Total	**4.51**	**Strongly Acceptable**