DEVELOPMENT OF AN ONLINE MANAGEMENT SYSTEM FOR INSTITUTIONAL SUSTAINABILITY ASSESSMENT

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Abstract

The study focuses on developing a management system for institutional sustainability and an evaluation of its quality in use. When used, the system could document classification, loading, assessment, security, assessment rating reports, and system audit logs. ISA system was an online communication platform for flexibility in the evaluation and organization of documents. It includes user credentials and access rights, upload and download documents, view assessment results, and print documents and summary results. The outcome of the assessment determines the Higher Education Institution's Sustainability. The study used a developmental research approach and a Rapid Application Development (RAD) System Life Cycle to design and develop the system. RAD includes requirements planning, user design, construction, and cutover. A descriptive approach was used to evaluate the system's quality and adopted a standardized questionnaire from ISO/IEC 25010:2011 Software Product Quality Model. The thirty (30) respondents of the study were selected using the purposive sampling technique. Mean was used in the overall rating. The system was rated 4.68 interpreted as very high by the respondents composed of the Quality Assurance Director, Deputy Quality Management Representatives, KRA Chairpersons, KRA Committee Members, ISA Assessors, and System Experts. The system was found to be easy to use and reliable in handling documents to support academic quality assurance. The system may contribute to the assessment and management of documents in the higher institution in the Philippines that entails heavy documentation to minimize the use of papers, speed up communications, save time, and increase work productivity in the preparation and actual assessment.

Introduction

The goal of every private and public university and college is to ensure academic quality to its optimum level (Mokhtar, 2016). Quality assurance (QA) was considered a process in assessing the policies, processes, and procedures being presented to maintain, develop, and achieve desired quality. The Columbian case in higher institutions prefers a standardized indicator for sustainability on reporting and organizing documents (Gutierrez, 2018). Likewise, the sustainable assessment of HEI improves the comprehensiveness of competing for higher institutions' sustainability assessment (Bullock, 2016). It also requires extensive documentation to support academic QA, such as manuscripts, illustrations, diagrams, memos, and other documents that serve as sources of information and references or critical documents (Mokhtar, 2014). In the Philippines, the Commission on Higher Education (CHED) believes that Higher Educational Institutions (HEI) could deliver quality programs through quality assurance. These programs should meet the country's needs, compete in global markets, and be at par with other foreign universities. Hence, CHED requires all HEIs to undergo Institutional Sustainability Assessment (ISA) to improve the internal QA systems and processes of every Institution (CHED, 2017).

The study developed an online system that managed documented evidence and essential documents to prepare and implement the ISA activities to ensure the quality of service dealing public and private universities and colleges. Standardized indicators from CHED were adopted as the basis for the digitization of the ISA documents. The system helps minimize the use of papers, speed up communications, save time, and increase work productivity in the preparation and actual assessment.

Methods

Research Design

The study used developmental and descriptive methods. A developmental approach was used in the design and creation of the management system for Institutional Sustainability Assessment. In contrast, a descriptive approach was used to evaluate the quality of the system using a standard questionnaire, ISO/IEC 25010: 2011. The researcher developed an understanding of how to efficiently and effectively design and create a management system for Institutional Sustainability Assessment.
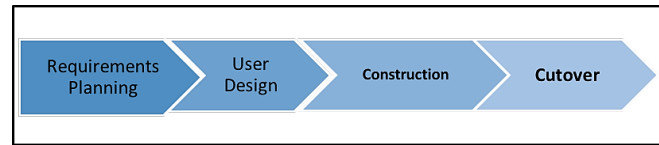
Figure 1.0 Rapid Application Development Methodology

Since RAD was a prototyping software development, it prioritized quick prototyping and prompt feedback over long development and testing cycles. It was flexible to suit the user's needs. RAD had 4 phases: requirements planning, user design, construction, and cutover.

During the requirements planning, there was the determination of system process flows and requirements on the preparation and actual ISA assessment at the different points of the development cycle. The documented information and the self-assessment of the HEI were considered inputs in the system.

The user design phase used the analysis of the process to develop the system structure and screen layouts. ISA software provided a straightforward, concise, familiar, responsive, attractive, and efficient interface for the end-user.

Hence, the construction phase included the software development with different features and functions. The prototype was shown to the respondents and was decided upon according to the shown requirements and analysis from previous phases. This prototype was rapidly constructed to show its particular features. The final product was only constructed on the finalization for both the developer and users of the software.

Lastly, the cutover phase culminated in the system's features, functions, and aesthetics before deployment. More so, the software delivered easy searching and retrieved of documents, generation of reports, and secured document management.

Parameters of the Application

The system covers the management of ISA documents. It provides an online communication platform for flexibility of assessment and organization of documented information according to key result areas (KRA), indicators, criteria, elements, and possible outcomes.

The feature on document classification organized the documents according to HEI, assessment period, and KRA. Before the uploaded documents become available to the system, it required HEI data such as assessment period and KRA. This action was helpful for the KRA chairperson to identify under what criterion, indicator, and elements.

The system could upload documents using a portable document format (PDF) according to the elements, criteria, indicators, and KRA requirements. Only the assigned Chairperson of certain KRA could upload and access the specified area to ensure the confidentiality, integrity, and availability of documents.

Another feature of the system was the assessment of the documents. The evaluation of documents was according to a specified element, indicator, and criterion of a certain KRA. After loading all possible evidence sources, the Chairperson evaluated the documents and encoded the system processes required for every benchmark statement. Assessors performed the management of feedback assessment and rating evaluation of indicators. This feedback and evaluation were features of the system that provided for every assessor.

Further, the system feature of information security applied an SHA-256 cryptographic hash algorithm. This authentication method ensures that only authorized users could access the information from the system. The assessors could access to feedback and rating results and print reports defining the condition regarding institutional sustainability. Also, the design feature of the system audit logs could ensure the integrity of the actions and access in the system.

There were three (3) external entities or users' roles to access the system: Chairperson, assessor, and administrator. Each entity had roles in how the system functions and operates according to its purpose. The managing administrator of the system could add users and access rights, upload and download PDF documents, view assessment results, and print documents and summary results. The documents were classified based on HEI, assessment period, and KRA.

On the other hand, the chairperson of every KRA could download and upload PDF documents, access only assigned KRA using a PDF document to the elements, criteria, indicators, and KRAs required. Thus, the ISA assessor could view, assess, rate, and print the PDF documents. The system could print the following documents: KRA chairperson assessment, self-evaluation document rating, assessors' assessment scoring, and findings. It further included security features for the KRA chairperson, OIQAG assessors, and system administrator. However, it did not cover the issuance of a certificate of compliance after the assessment.

Respondents of the Study

Purposive sampling was used to select thirty (30) respondents to evaluate the system's quality. The respondents were the quality assurance director, deputy quality management representatives, KRA chairpersons, KRA committee members, ISA assessors, and system experts.

Research Instrument

A standard questionnaire, ISO/IEC 25010:2011, was used to rate the system's quality. It used a five-point scale, where five was the highest and one, the lowest. The standard questionnaire was personally distributed to the respondents and was retrieved after the respondents answered them.

Data Treatment Analysis

Mean was used in computing the system's quality. The mean rating was interpreted using the following scale:

Mean Score	Verbal Interpretation
4.21-5.00	Very High
3.41-4.20	High
2.61-3.40	Moderate
1.81-2.60	Low
1.00-1.80	Very Low

Results and Discussion

ISA supported the effectiveness of the institution's governance and management, high-quality standards of teaching and learning, relevant and responsive professional and research programs, support to students, and community involvement and linkages (CHED, 2017). This undertaking helped establish and strengthen the internal quality assurance systems for the sustainable development of the institution.

The first specific objective of the study was to develop a management system for Institutional Sustainability Assessment with the following technical features: document classification, document loading, document assessment, document security, assessment rating reports, and system audit logs.

The document classification helped organized the documents based on which HEI, assessment period, and KRA it belongs. User interfaces were provided for users to key in the data for HEI,

assessment period, and KRA. A normalized data table coupled with a user-friendly system interface for the assessment period, HEI profile, and KRA were created to reduce data duplication contained within the database and to help finish the required task in a lesser time. Nagatsuka et al. (2007) attested that the classification system of a document reveals the user's intention to classify the document to achieve an accurate result of classification in a short time.

The document loading upload documents using a portable document format according to the elements, criteria, indicators, and KRA requirements. Only the assigned Chairperson to such KRA could upload and access the specified area to ensure the integrity of documents to be assessed. The document uploaded to the system was a portable document format (PDF). This open standard file format protects the fonts, formatting, graphics, and color of the source document, regardless of the platform or application used. The user can attach an electronic copy of the records in the event the server received the file and scans for malicious code. Mousty, Karnatapu and Fatima (2015) supported this action in their study, "System and method for uploading and verifying a document." The user's transmitted file or uploaded record was viewed using a client device to guarantee that a suitable file was uploaded and corrected.

Subsequently, the document assessment covered the evaluation of documents under specified elements, indicators, and criteria of such KRA. A self-assessment for Chairperson was considered after loading all possible sources of evidence and by encoding the system processes required or needed for every benchmark statement. On the other hand, the assessor rated and assessed through remarks for the relevant and required documents for each KRA. Standard assessment tools from CHED-OIQAG were adopted in this system. The assessment interfaces were designed according to the standard forms during the assessment. Cadorette, Vall, and Arcentales (2002) proved that evaluating a document using an automated system comprises a method following the functions of the system for data acquisition from the document presented by the user. This method facilitates the evaluation of the documents. It was then directed to the evaluation process, and the creation of compliance with the prescribed document and protocol was recorded.

Moreover, the document security of the system assured that data were only accessible to an authorized user to prevent modification or alterations. It proved that any actions that had taken place in the system could not be repudiated, traced, and authenticated. This security of access to documents made use of the SHA-256

cryptographic hash algorithm in the password provision. The document security feature requires the user identification and password to access the system assigned by the system administrator to the chairpersons and regulatory assessors. Dhillon and Torkzadeh (2006) emphasized that security in information systems was a challenge for professionals and executives because of its technical nature with restricted considerations from users and organizational issues. Security employed organizational perspective and the values of people in using the system.

Furthermore, the assessment rating reports known as the feedback and rating results of the ISA assessors were the outputs printed for the HEI to define the condition in terms of institutional sustainability. The assessment rating report, the feedback, and the rating results of the assessor were both viewed and printed by the assessor and the system administrator. A standard format of a rating document from CHED-OIQAG was adopted. Garb (2007) emphasized that computer assessment must be combined with individual judgment.

Additionally, the system audit logs were designed to preserve the integrity of the system through a list of user actions performed in the system, where no deletion and modification were allowed because it provided details of the activities performed by the users. The system audit logs maintained the information and integrity of the system. With this, the system confirmed that only the assigned users can use the system. Any actions in the system were recorded as system logs. Holt (2006) provided a strong claim that the data stored through system logs could not be modified.

The second specific objective of the study was to evaluate the quality of the system in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. Table 1 shows that the generality of the system components was rated very high.

The usability of the system was rated as the highest (M=4.86) among the eight characteristics, with a verbal interpretation of very high. The respondents found the system easy to use and appropriate to their needs in the institutional sustainability assessment. According to the study of Rodríguez et al. (2015), usability was the level of connection between the user interaction and the application that simplifies the components of the solution in the implementation.

Table 1

Evaluation of Respondents on the Evaluation of Online Management System for Institutional Sustainability Assessment

Areas	Mean	Verbal Interpretation
Functional Suitability	4.81	Very High
Performance Efficiency	4.77	Very High
Compatibility	4.41	Very High
Usability	4.86	Very High
Reliability	4.72	Very High
Security	4.85	Very High
Maintainability	4.39	Very High
Portability	4.52	Very High
Overall Mean	4.68	Very High

Consequently, the security characteristic was rated as second from the highest. The respondents experienced how the system was designed to protect all the assessment documents with a user ID and password for the specified User. In addition, any actions within the system that took place were traceable. This was supported by Ouhbi et al. (2015), who claimed that the security characteristic was the most influential requirement for information sharing.

Subsequently, the functional suitability characteristic was rated as 4.81 or very high after the security characteristic. It showed that the system provides an appropriate set of functions for a specified task. The level of quality was reached because the system's functionalities met the stipulated requirements. Hence, Oviedo and Piattini (2015) claimed that usability, security, and functional suitability were rated as the top three positive responses of over 70% of the respondents.

Moreover, the performance efficiency through the system's response time and processing time to perform a function was rated 4.77 or very high. The performance efficiency was emphasized between the communication time of the server and the client, where less possible time was performed for fast downloads (Acharya & Sinha, 2013)

In addition, the system was reliable when used under normal operations. The evaluation on reliability was very high, with a mean of 4.72. Amara and Rabai (2017) claimed that reliability was the probability that the software product operates for a given amount without violating the specification.

The system portability was also rated as very high. This finding indicates that the system was effective and efficient in installing and

adapting to another operational environment. Moumane et al. (2016) considered portability as impacted by the storage and user interface capacity to new environments.

Moreover, the compatibility of the system in terms of performing the required functions was rated very high (4.41). The system was easy to modify and maintain without affecting the other parts of the system, resulting in a very high or 4.39 rating result. Oliveira and Peres (2015) supported that compatibility had a low desirable response among other parameters or characteristics during the evaluation activity.

To sum up, the general assessment of the system was very high (M=4.68). It shows that the system able to manage documents of the institutions on its sustainability assessment.

Conclusions

Based on the foregoing results, the following conclusions were derived:

1. The developed system provides features that contributed to the management of documents, such as document classification, document loading, document assessment, document security, assessment rating reports, and system audit logs in the preparation and actual evaluation for Institutional Sustainability Assessment.

2. The ISA management system is appropriate to perform specified tasks according to the needs of the user, easy to use, and reliable in handling assessment documents. The system is essential to support the academic quality assurance, particularly on the institutional sustainability assessment that entails heavy documentations. The system is secured, easy to maintain, and has user-friendly interfaces.

Recommendations

Based on the findings and conclusions of the study, the recommendations are the following:

1. To Higher Educational Institution (HEI), the developed system may help improve the preparation and assessment activities of the quality assurance office on its pursuit for institutional sustainability assessment, particularly in storing documents in a secured and efficient manner.

2. The College may adopt the Management System for Institutional Sustainability Assessment to enhance the preparations and assessment activity.

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