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Electronic Document Management System for Higher Education Institution

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Abstract :- The study looked into the current document management problems in Higher Education Institution based on the QMS of ISO 9001. It found several discrepancies in terms of tracking, keeping and transferring of the memoranda and files from one office to another. These files were elicited from several circumstances such as loss of documents and redundancy, to name a few. Because of these problems, an Electronic Document Management System (EDMS) was introduced. The study used two methods such as the Spiral Model and the In-house Development Program. The EDMS was completed and tested by the three colleges of Capitol University namely, Computer Studies, Business Administration, and Criminology. Moreover, the modules of EDMS were also evaluated by deans and secretaries of the same colleges. The evaluation phase found differences in terms of time spent for the documents that were covered and was further monetized to visualize cost-reduction measures as a tool for its implementation. As the result, EDMS is acceptable in terms of quality, time spent, and cost. It is recommended that the EDMS must be fully implemented in all colleges in the university. It is further recommended that there should be another study to upgrade the EDMS and to make it on-line for a centralized and efficient way of monitoring and tracking the documents.

Keywords: *Electronic Document Management System, In-house Programming, Product Evaluation, Quality Management System.*

I. INTRODUCTION

A document plays a vital role in most businesses. It serves as a piece of evidence in transactions or as a record of written contracts. It exists to ensure specific functions and processes, and it must be implemented properly. These functions and processes entail tracking, transferring, and monitoring of files. If in case the task is not properly managed, it becomes a problem.

Managing records, for example, demand focus. Important documents must be monitored and checked to keep the records in the order. If these documents are lost or misplaced due to inaccuracy of handling them, retrieval of these documents is done repetitively. Particularly, in big universities, these important documents must be monitored.

Capitol University has eight colleges and is advocating for the use of technology to improve its processes. One of its strengths is on securing accurate file entries or detailed achievements of the departments. These file entries are arranged including the students and the faculty documents, instruction manuals, library files, laboratory documents, physical plans, and community involvement outputs, organizational documents, and administrative files.

One of the components of document management system is the use of catalogue. It is used to arrange files to where these documents belong. Moreover, Capitol University also uses the Cataloguing system, but is based only on the Quality Management System where files have been labeled to link numbered references.

Capitol University developed and implemented a Quality Management System (QMS) in April 2006 that covered all functions, processes, operating procedures, objectives, responsibilities, resources, and infrastructures needed to implement effective quality management. The Quality Management System (QMS) includes the Quality Policy, Interactive Processes, Quality Manual, Documented Procedures and Work Instructions, Documents needed to Operate, Monitor and Control Processes, and Quality Records (Figueroa, 2010).

This study is implemented in three colleges namely the College of Business Administration (CBA), College of Criminology (CoCrim), and College of Computer Studies (CCS). During the initial interview with the respective heads, these colleges have had the same documentation procedures. However, these colleges differ in the document contents and folders because these are not dependent to one another.

Furthermore, the Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA), as an accreditation committee, has been tasked to check these

documents for evaluation. During the quality assurance, the documents needed by the inspectors are searched from the shelves where the allotted time to locate these files is only thirty (30) seconds. The PACUCOA also monitored the quality and the availability of the documents. The quality of documents would mean that within five years the files must be intact, clear, and updated.

The noted non-conformances to the Quality Management System based on the Internal Quality Audit for year 2007 until 2011 recorded an indication of minor lapses in the proper implementation of the documentation policy of the University. These lapses would include the following: no master list for all files, scattered records, no list of quality records, incomplete files, lack of QMS number, and disorganized files. In addition, there have also been problems in keeping records from the disposition logbook (QMS, 2011).

With this problem identified, an Electronic Document Management System (EDMS) was suggested to automate the tasks in tracking and monitoring the documents. Moreover, this system would make use of cataloguing services for file search and index to address the availability and quality of documents. Some of the features of EDMS are fast retrieval of data, organized filing, added lists of quality records, and data bank wherein the files are placed and organized in one location. More so, the system could provide a simple, accurate transmission of data files that should be tracked and monitored. This idea has been an aid to perform the task efficiently. Lastly, the study would help not only in improving the present system but also in competing globally with information technology.

II. OBJECTIVES

The main objective of this study is to develop and deploy an Electronic Document Management System to support the Quality Management System of Capitol University.

The researcher will also determine the problems encountered by the three colleges in the existing documents management system, the researcher will then design and develop Electronic Document Management System that would satisfy the requirements and addresses the problems of the three colleges.

After it will be developed, the system will deploy in three colleges then the last phase is to evaluate if there is significant difference between the existing document system and the EDMS in terms of quality, speed, and cost.

III. METHODOLOGY AND DESIGN

This chapter discusses the research design and the research methodology used. The research methodology section describes the requirement gathering and analysis, system design, programming and implementation, and evaluation for the EDMS.

3.1 Research Design

This case-based study involves three colleges of Capitol University, namely: College of Computer Studies, College of Business Administration, and College of Criminology .The Capitol University adopted the In-house approach in the development and deployment of the EDMS. Furthermore, the Spiral Model is used to serve as the framework in the development of the EDMS.

3.2 Research Methodology

3.2.1 Requirement Gathering and Analysis

In gathering the system requirements, interviews are conducted and pre-test questionnaire are used to analyze the gathered data. The interview is conducted in the three colleges on a one-to-one basis to determine the document management procedures and the problems encountered in the university. These interviews also aim to find out the flow of the documents throughout the process of receiving, searching, and monitoring and through the filing procedures. Along with the interview, pre-test questionnaires are given out to the end users such as the deans and the secretaries to evaluate the system requirements (See appendix F for the pre-test questionnaire).

3.2.2 System Design

The researcher uses the structured design technique of the Electronic Document Management System. This structured design technique is used to analyze the system requirements. In addition, the flowchart with swim-lane and context diagram of the existing document management system is used to analyze and design an enhanced document management system.

After the enhanced EDMS is created, the program module diagram is made in order to define each process specifically. Then, the researcher uses the Entity Relationship Diagram to design the data structure of EDMS (Shelly, et al, 2009).

3.2.3 Programming and Implementation

In this study, Rapid Application Development is used to develop the program since it depends on prototyping and user involvement. The RAD process allows the end users to examine a working model as early as possible. This also determines if the undergoing developments meet their needs. Based on the user input, the prototype is modified.

In the process of creating the program, the researcher conceptualizes a procedure, so he could create the program that would meet the needs of the end users. The EDMS also adapts the setting arrangement of the three offices in the three colleges in which these includes creating the program module diagram to define each process specifically. Through these set-up and diagram, the researcher uses them as a guide to create the system using the Visual Basic 2008 and Microsoft Access. These Visual Basic 2008 and Microsoft Access serve as the front end and the back-end of the EDMS respectively.

Moreover, after coding the program using the Visual Basic 2008 and after finding errors of the system created, the researcher informed the deans and the secretaries for the schedule of the training (See Appendix D). After the training, the EDMS is installed in the computer of the three colleges. The EDMS, client-server architecture is running on a windows environment.

3.2.4 Evaluation

In the final phase, the system is evaluated for its acceptability. The end users such as the deans and the secretaries of the three colleges are given pos-test questionnaire to evaluate the electronic document management system with regard to functionality, speed and cost.

3.2.4.1 Post-Test / Data Gathering

After the schedule for the training and seminar, the EDMS is deployed at the three colleges for actual use. The deans and the secretaries are given two weeks to use the system, and they take the post-test to evaluate if there is a difference between the manual and the automated system in terms of functionality, time spent, and cost. In the post-test, the end users are asked to give out their comments and suggestions if the Electronic Document Management System needs improvement.

3.2.4.2 Data Scale Processing

In this study, the Likert scale is applied to measure the EDMS functionality. Each scale reveals a corresponding value and description of points. For example, if the measure described in the item is done at all times, the point value is five, which means "always." If the measure described in the item is done in the majority of cases, the point value is four, which means "often." Then, if the measure described in the item is done in many but not the majority of cases, the point value is three, which means "occasionally." Next, if the measure described in the item is done in a few times, the point value is two, which means "seldom." Finally, if the measure described in the item is not done at all, the point value is one, which means "never."

The scoring guideline and the statistical procedure are used in interpreting the data. These data come from the three categories being evaluated such as functionality, speed, and cost. Moreover, the question on functionality is divided into three. The first question is focused on "organization", the second to fourth on "security", and fifth and sixth questions on "management". Finally, these questions are used to determine the significant difference between the manual and the automated system.

3.2.4.3 Statistical Analysis

The study uses the T-test statistical analysis for paired observations. The paired T computes a confidence interval and performs a hypothesis test of the mean difference between paired observations in the existing manual system and in the EDMS. This paired t-test matches the responses of the end users in the pre-test and post-test. Lastly, the paired t-test is also employed to measure the three categories such as functionality, time spend, and cost.

IV. RESULTS AND DISCUSSION

Figure 1 shows the manual process of managing the incoming documents. The figure also presents where the documents are placed after the dean received them. The secretary then arranges and organizes these documents. Upon receiving these files from the other colleges, the secretary records these documents to the logbook for monitoring purposes. After recording to the logbook, the secretary forwards these files to the dean. The dean, for filing purposes, gives these documents back to the secretary. The secretary files the documents to the specific boxes, and these boxes are placed in the cabinets with their respective accession number. When the dean searches for the document, the secretary then locates it in the quality record book. If the dean want to monitor the document again, the secretary refer to the record book when it was borrowed or released from the file. At times, problems arise when the listed documents on the shelves did not coincide with the records they kept. Consequently, this created another problem in monitoring the documents.

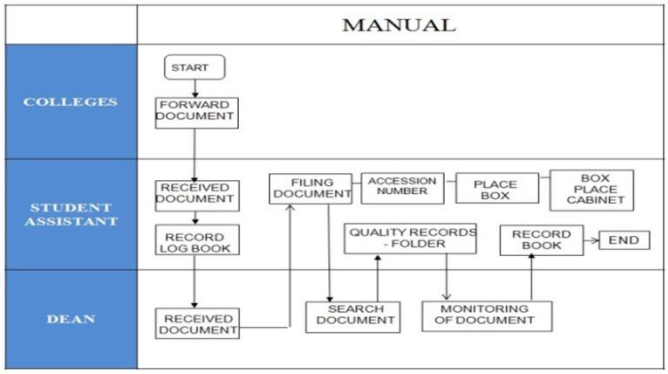

Figure 1. Data Process of the Manual Document Management System.

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Design an Electronic Document Management System that would satisfy the requirements and addresses the problems of the three colleges.

The researcher applied the structured design technique of the Electronic Document Management System to analyze the system requirements. This structured design technique led the researcher to design the EDMS that would satisfy the needs of the end users. In addition, the flowchart with swim-lane and context diagram were used to enhance the existing document management system.

After an enhanced flow of the EDMS was designed, the program module diagram was created in order to define each entity. Then, the researcher employed the entity relationship diagram to design the data structure of the EDMS. Figure 2 shows the access level and the process flow of the document management of the deans and secretaries.

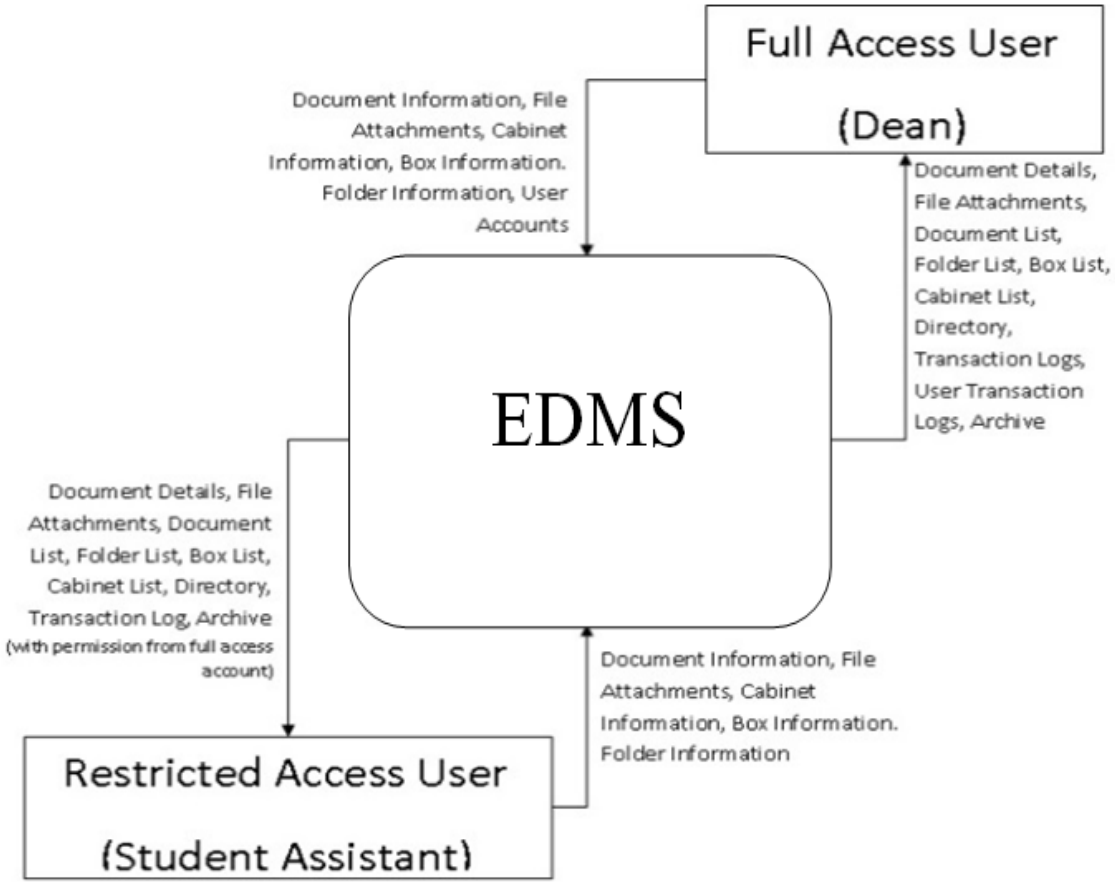

Figure 2. Contextual Diagram for EDMS.

The dean has full access in terms of document management. With the existing system the secretary only enters the detailed information of the documents and searches for these documents for monitoring and tracking. When a new document is received, it goes through the secretary before being forwarded to the dean. With the electronic document management system, the researcher implemented the usual hierarchy level wherein the dean is given a higher authority and the full access to use the system.

In designing the EDMS, security was a key consideration. Authorization and access levels of the different users were evaluated. The contextual diagram found in figure 2 graphically explains the access level of the deans and the secretaries. Through the contextual diagram, this helped conceptualize and enhance the existing flow of the swim-lane diagram. In figure 3, the study shows the improvement of the manual document management system using swim-lane diagram.

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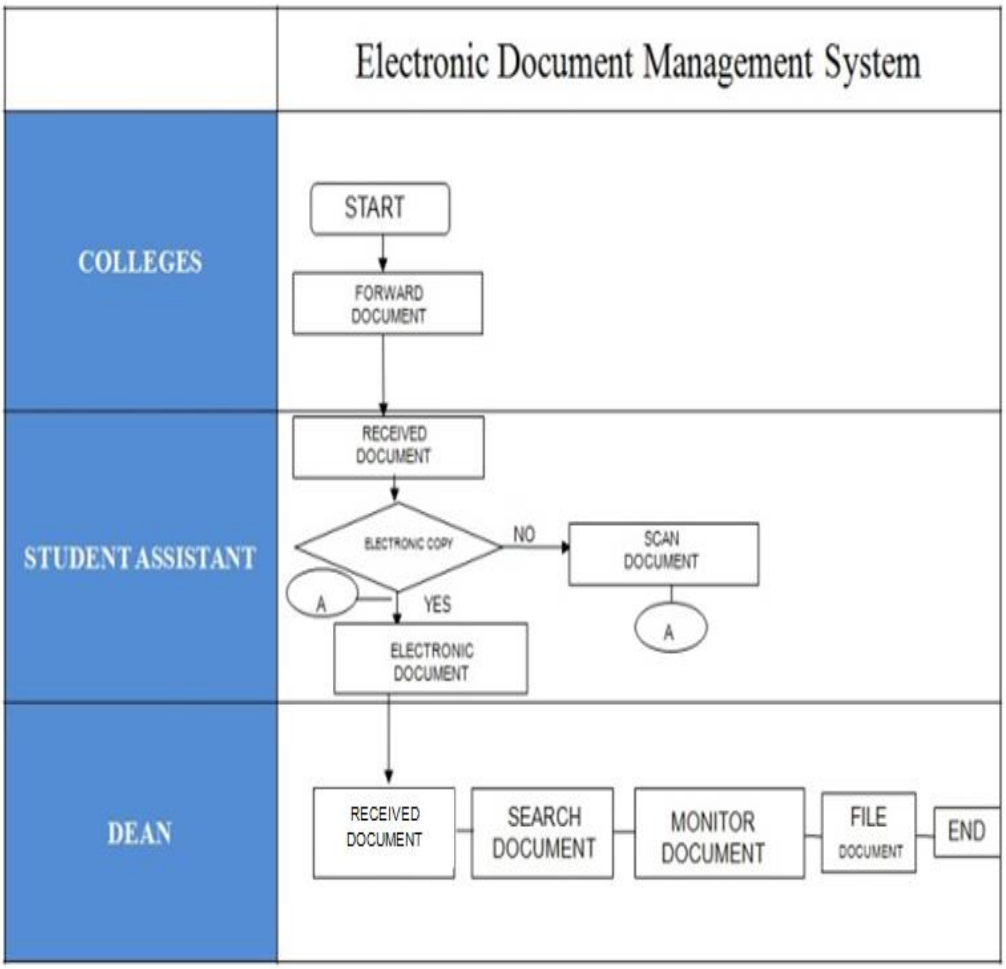

Figure 3. Data Process of the Electronic Document Management System.

In the manual document management system, the dean would depend on the secretary because the secretaries had to record these documents for logging purposes. This would include the recording and tracking of persons who took the documents. Every time the dean would need access to the document, the dean requires the assistance of the secretary. The secretary in turn would have to look into the quality record book as reference in retrieving the needed document. However, with the EDMS as shown in the swim-lane diagram in Figure 4.3, they shortened the document management process since the deans could store and retrieve the records. As a result, these work activities were no longer dependent on the secretary. Develop and deploy electronic document management system in three colleges.

In this study, Rapid Application Development is used to develop the program since it depends on prototyping and user involvement. The RAD process allows the end users to examine a working model as early as possible. This also determines if the undergoing developments meet their needs.

In the process of creating the program, the researcher conceptualizes a procedure, so he could create the program that would meet the needs of the end users. The EDMS also adapts the setting arrangement of the three offices in the three

colleges in which these include creating the program module diagram to define each process specifically.

V. PROGRAM MODULE DIAGRAM

Figure 4.4 shows the program module diagram of the Electronic Document Management System. This program module diagram served as the blue print of the program in terms of its functionality and detailed specifications of every

module in the EDMS.Through this diagram, the researcher is guided towards creating the source code of the program in EDMS.

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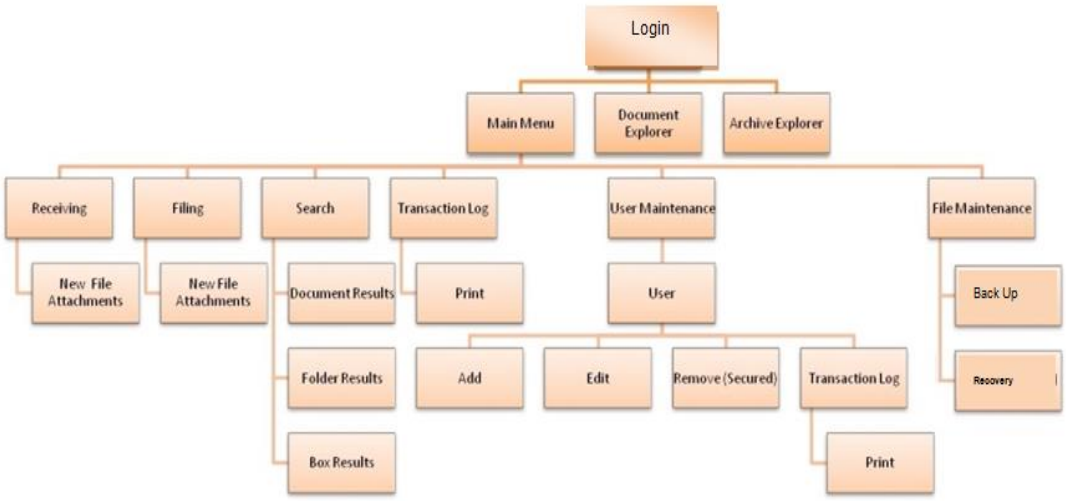

Figure 4. Program Module Diagram.

Identify if there is a significant difference between the existing Document Management System and Electronic Document Management System in terms of quality, speed and cost.

The researcher employed the paired t-test to identify if there is a significant difference between the existing document management system and the EDMS.

Functionality	Manual	Manual	Automated	Automated
	Average	%	Average	%
1. There is a system/path to which an official document flows from one office. (20%)	3.17	.63	4.83	.96
2. The document is secure; only official person can access/see it. (10%)	3.67	.367	5	.5
3. The document is secure; it cannot be easily lost/misplaced (10%)	3	.3	5	.5
4. The document is secure; it is easily to track its movements. (10%)	3.5	.35	5	.5
5. Responsibilities and authorities are defined and communicated within the organization. (25%)	4	1	5	1.25
6. Ensure that the planning of the quality management system is carried out in order to meet the requirements. (25%)	3	.75	5	1.25
Total		3.05		4.96

Table1. Results on the functionality of manual and automated systems

1.1-1.8	Never
1.9-2.6	Seldom
2.7-3.4	Occasionally
3.5-4.2	Often
4.3-5.0	Always

Table 2. Hypothetical range with corresponding interpretation

Moreover table 2 shows the functionality test result between the manual and automated system. To compute the time spent and speed in the document management process, the researcher took the average time per minute for every transaction of the documents based on the pre-test and post – test.

Then, the computed time spent for each college was multiplied by the number of minutes per day. The number of minutes per day result is multiplied by twenty-two days to get the monthly result per minute. Then, the monthly result per minute is divided into sixty minutes to convert into hours. This computation is the same procedure on the post-test for the automated system. As a result, EDMS is favorable.

As a summary, t-test for paired observations was used to determine if there is significant difference between the existing method and the automated in terms of its functionality and speed. Table 4 showed the results. The null hypothesis of no difference was tested against the alternative hypothesis that there is significant difference at 0.05 level of significance.

Based on the pre-test and post-test questionnaire	Hours per Monthly Transaction on Document Management					
	Manual			Automated		
	CS	BA	Crim	CS	BA	Crim
Time spent in receiving, stamping and forwarding to specific office documents.	15.55	5.50	6.42	2.93	3.30	3.30
Time spent in recording the documents	8.80	4.40	5.50	2.93	3.30	3.30
Time spent forwarding the documents to the dean/chairperson	6.73	4.77	5.90	2.93	3.30	3.30
Time spent filing the files	4.69	4.77	8.98	4.40	4.40	2.20
Time spent searching for files	8.80	6.60	7.70	2.93	3.30	2.20
Total	44.57	26.03	34.50	16.13	17.60	14.30

Total Number of Hrs in Manual	Total Number of Hrs in Automated
105.11	48.03
Time Saved per Month	
57.08	

Table 3. Time saved and time spent of the secretaries from the manual to the automated system

AREAS		t-value	p-value	Decision/Conclusion
Functionality	Organization	-2.71	0.042	Significant
	Security	-4.65	0.0000	Significant
	Management	-3.92	0.002	Significant
Time and Money Savings		4.47	0.0000	Significant

Table 4. showing the T-test Results on the select areas of study of the EDMS

Since the p-values are lesser than the level of significance 0.05, the null hypothesis of no difference is rejected. Thus, the Automated System is more effective than the existing system in terms of its functionality and speed.

VI. CONCLUSION AND RECOMMENDATION

A. Conclusion

Based on the Internal Quality Audit Report, the EDMS addressed the need to improve the current Document Management System. The EDMS main purpose was to support the Quality Management System of Capitol University. As the study aimed at answering the following questions on functionality, time spent for work, and cost, the results of the study revealed the following details. In terms of functionality as presented in table 4.1, EDMS obtained 4.96, which is "always" on the hypothetical range. It means that the measure described in the item is done at all times. In contrast to the manual system, it only got 3.05 in which the measure described in the item is done in many but not the majority of cases. Then, for the time spent, EDMS obtained 1.43 mean rating as time saved. On the other hand, the manual system got 2.43. This means that the manual system spent too much time in the process of document management. Finally, in the case of cost, EDMS took advantage over the manual system. Table 4.5 shows that EDMS could save money amounting to P1,141.53 a month based on the computation. This would mean that the EDMS is favorable.

The findings revealed in table 4.7 that p-values are lesser than the level of significance 0.05, the null hypothesis of no difference is rejected. Thus, the Automated System is more effective than the existing system. Therefore, the use of EDMS for the three colleges of Capitol University has proven to be beneficial in terms of functionality, cost and time.

The study of Electronic Document Management System (EDMS) for the case of Capitol University proved to be beneficial, useful, and practical particularly in the offices. After the program was installed, the three colleges were thankful as they were subjects of the study. The researcher has learned that the use of EDMS should be studied and experimented further in a year for a more enhancement in terms of the problems encountered in the procedures of managing the documents. However, in the experimentation, the EDMS in any categories or variables of tests has shown a remarkable change in contrast to the manual system.

Recommendations

Based on the findings and results, the following recommendations for the Electronic Document Management System for Higher Education Institution were enumerated:

It is recommended that the Electronic Document Management System for the case of Capitol University should be fully implemented to all colleges.

It is recommended that an upgrade of EDMS to be online for a centralized and efficient way of monitoring and tracking the documents.

It is recommended that the further studies will include not only the documents for the academic but all documents in the offices such as students and the faculty documents, instruction manuals, library files, laboratory documents, physical plans, and community involvement outputs, and many others..

For a full functionality of all computers of the end users, it has been recommended that power user's account be assigned to all end users.

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