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Developing Digital Research Portal for Bukidnon State University's Scholarly Work

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ABSTRACT: Accessing to many article directories and institutional repositories can often the bane of students and academics. The absence of online tool to locate and access high-quality and digitally-stored research was the common issue which may lead to an unintentional duplication of other research work in the campus. Hence, a record of references and scholarly masterpiece of researchers in Bukidnon State University (BukSU) must be provided. This study aimed to develop a web-based application called Research Portal which consists of research articles as a quick references and up-to-date information about the university researcher. This software has evolved as a comprehensive record management system to track status of ongoing research commitments. Additional features were the notification and real-time collaboration tool which builds a key element of visibility in all aspects of information. Thus, if current article exhibits similarity in the previous work, the researcher will be prompted to plan their whole research differently which save time, money and research effort. As a knowledge management system, it has a tracking features that helps the admin track the progress of the manuscripts submitted to the university according to its status which ranges from proposal to utilization or commercialization stage. The researchers used the method of Waterfall Model as the process model for system development. As a web-based system, it used PHP, FTP Server, and MySQL as a programming and database tool. This technological solution which provides a gateway to the University's wide range of research activity was introduced with the stakeholder. Using random sampling method, the system evaluation involved 45 different respondents composed of researchers representing students, instructors and representatives from the Research Units to assess the acceptability of the system. This 2-day evaluation period includes interview, survey evaluation, alpha and beta testing of the proposed software. The evaluation results yielded a total of 97.90% which means that the system was highly acceptable and ready for deployment and implementation.

Keywords: Document Tracking, Modified Waterfall Model, Real-Time Collaboration Tool, Record Management System, Research Gate, Research Portal.

Abbreviations: BukSU, Bukidnon State University; PHP, hypertext preprocessor; FTP, file transfer protocol; KMS, Knowledge Management System; mySQL, structured query language; IPO, input-process-output; PDF, portable document format; DMS, document management system; RRMS, research record management system; XAMPP, Cross-Platform (X) Apache (A) MariaDB (M) PHP (P) and Perl (P); RAM, random access memory; TB, terabyte; LCD, liquid crystal display; PRP, Personal Research Portal.

I. INTRODUCTION

From the dawn of the civilization, the record management system already existed according to Adam, A. (2007) [1]. He demonstrated that even the caveman, our early ancestor have their documents and pictures painted on the wall, engraved in the steel or a stone tablet. The discovery of those documents brought ideas and clues for the researchers about the history, lifestyle, religion, and engineering of ancient civilizations like the Mayan and the Egyptian. Based on the properties of their documents, it is very sensitive and the environment obviously is hostile; keeping and tracking these records is a huge task.

As the world is changing and the development and modernization are unavoidable. In our modern generation, where most data stored electronically in a centralized storage machine, it gives us the ability to track and retrieve the documents in minimal time. These abilities are essential in the universities to track research paper made by the students and instructors.

An Assessment of the Effectiveness of Electronic Records Management at Africa University, Mutare, Zimbabwe is a study authored by Bigirimana, S. *et al.,* (2015) [5] which focuses on the effectiveness of the management of electronic records at Africa University. Destruction and retention policy was found in their Electronic Record Management System. Moreover, the collaboration between authors and the BukSU Research Unit is essential mostly when the paper was currently on its publishing stage. Those features were considered as the gap with regards in the proposed system BukSU Research Record Management System. This study is for the students, alumni, and teachers of the university conducting a research paper. This is purposely implemented to give ease access of the research papers as reference to the student as a novice in the

field of research writing. To make it possible, conducting a system specifically a record management system that contains all the research paper made by the research writers of BukSU as a reference. The aim of the researchers is to develop a system that will store research documents for convenient tracking. The model used by the researchers is the Input-Process-Output (IPO) in describing the conceptual framework of the system. What goes in is the input; what causes the change is the process; what comes out is the output as stated by Armstrong (2001) [4]. The conceptual framework of BukSU Research Record Management System. The input to the system by the users will be the Research Details, Research Document PDF Format, Research Related Documents, and the Authors' information. Then process by the system itself and the output will be provided as BukSU Research Record Management System Web Application.

In the study Implementing Electronic Document Management System for a Lean Design Process by Giandon *et al.,* (2002) [11] analyzes how the implementation of the Electronic Document Management (EDM) can contribute for a lean management, particularly in the design process. According to Eleoranta *et al.*, (2001) [10], any kind of document is everything that must be stored in an accessible source. That's why all research papers made by the students and instructors of BukSU need to be filed in one system and must be easier to access but it should limit on its Portable Document Format. As stated by Hajjar and AbouRizk (2000) [12], the component of the overall project management which is essential is the construction document.

A web-based Personal Research Portal (PRP) was also developed as a knowledge management system to enhance reading, creating and storing knowledge in all school levels, helping to bridge digital divide in the academe [18]. This is an open-access journal which archives and publishes institutional research works. Although it builds digital identity to institutional researchers and builds network of colleagues, it lacks monitoring of submitted articles. The proposed system allows the administrator from the Research Unit to monitor status of paper including proposal, completion, dissemination, publication, citation, utilization and commercialization. However, in research documents tracking, the book status is one of the issues should be addressed especially if the author is applying to publish the document. Storing the documents in the secured and encrypted location gives the ability to see the book details faster according to Bunawan & Nordin (2015) [8]. However, accessing the unpublished book contents should ask the authors consent since his work was not copyright protected by the federal law. Sometimes, reaching the author is one of the difficult tasks. As a solution, the researcher comes up with the idea of building a profiler. This will help any user reach the authors for consent to access his work.

Kelemen and Mekovec (2007) [14], Document Management System (DMS): a case study of Varaždin County commonly provides solutions for the access, review, upload and download of the documents and queering capabilities. The said system likely similar to the study of this paper, the researchers have created BukSU Research Record Management System for the safety of the studies of the students and some instructors who have conducted research of BukSU, also putted some functions to access, review, upload and download their different studies. By the help of this system, a process of some matter is done more easily and measurable benefits for users in terms of information availability when needed, benefits organization in terms of completing works quickly, and benefits for whole society in historical record is accessible and reliable [13].

Unlike DMS, the users of BukSU Research Record Management System can upload research related documents like certificates from research paper awards. BukSU Research Record Management also have the unique features specifically the collaboration tools like real-time notification, real-time live chat between research instructor and the administrator, the step-by-step process on complying all the research requirements, and the like that cannot be seen on all the system stated. Likewise, Bukidnon State University developed a Ubiquitous Notification App which has greatly assist the BukSU students to be notified of the different events and activities of the university [3].

It is equally but important that the university has the ability to keep abreast with the recent trends of technology by taking advantage of this notification system.

As stated by Lavrakas (2008) [15], the random sampling method refers to a variety of selection techniques in which sample members are selected by chance, but with a known probability of selection. BukSU Research Record Management System used random sampling method as guided and stated by the statistician to conduct user assessment about the acceptability. There are 45 respondents composed of students, instructors, and research unit being considered in conducting a survey. This is the most widely used method for choosing a sample among the population for a wide range of purposes and remove bias from the selection procedure.

Fig. 1 shows the conceptual framework of the BukSU Research Record Management System. The input to the system by the users will be the Research Details, Research Document PDF Format, Research Related Documents, and the Authors' information. Then process by the system itself and the output will be provided as the BukSU Research Record Management System Web Application.

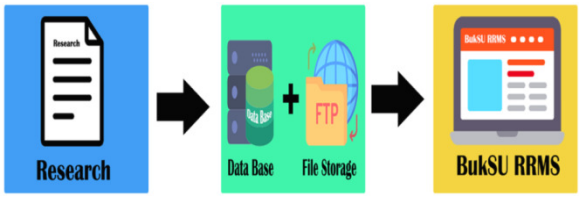

Fig. 1. Conceptual Framework.

II. MATERIALS AND METHODS

The researchers used the method of "Waterfall Software Development Life Cycle Model" as the process model for the development of BukSU Research Record Management System.

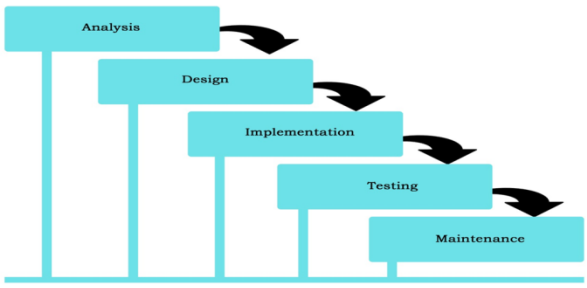

Fig. 2. Waterfall Software Development Life Cycle Model.

Fig. 2 is a sequential software development process as stated by Bassil (2012) [7]. Bassil enumerated five phases of this model: Analysis, Design, Implementation, Testing and Maintenance in order to build successful computer software. Each of those phases must be completed one after another and can be repeated endlessly until it is perfected as he justified. In the development process, a Modified Waterfall Model is an effective model for software development [3]. The researchers adopt this development life cycle to accomplish the BukSU Research Record Management System. In order to achieve the objectives of this study, the researcher are using the developmental research design implemented by various existing systems and programing languages collaborated together. Prior to the development the researchers conducted interview and disseminated a survey questionnaire in order to identify the functional requirements of this system. After the data was evaluated and analyze the designing process took place. The researchers were able to formulate possible solutions illustrated in different diagrams.

Analysis. Data gathering was done through surveying and interviewing different students of BukSU University, research instructors/faculty, and the research unit. This study is conducted in BukSU which is located at Malaybalay City, in the province of Bukidnon, Northern Mindanao, Philippines. The main target of this study is the Research Unit to compile all the research papers made by the alumni, students, and teachers of BukSU.

Design. This study made used of the research development design. This is in order to aid the problem in handling and tracking of digital research paper copies made by the students, instructors, and research writers of BukSU, developmental research design must use. Richey & Nelson (1996) [19], developmental research, as opposed to simple instructional development, has been defined as the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness. Developmental research design has contributed on making a successful system development. With the help of this research design, the researcher has the possibility to create various system designs, diagrams, and architectures; these were used for the development of the system.

Implementation. In this phase, the application design needs to be implemented to make a functional system. This phase included the specification of software and hardware requirements of the server and the client. In order to develop BukSU RRMS, the system minimum requirements for server were as follows:

• Microsoft® Windows® 10
• XAMPP version 5.6.30, PHP version 5.6.30, Google Chrome
• Intel Corei5 or higher
• 16 GB RAM or higher
• At least 1 TB Hard Drive
• 17" LCD Monitor.

Testing. The implemented system was put through various testing environments to evaluate the system's acceptability, to find and fix errors and to ensure harmonious execution.

Maintenance. After fixing the errors encountered during the testing phase and the system achieved its expected functionality. The proponents were in charge of maintenance of the system, fix any minor bugs and errors that will come up during operation.

Evaluation. To access the user acceptability of BukSU RRMS, the system was tested and evaluated randomly by students, instructors, and the Research Unit of the office of the Vice President for Research, Extension, and International Affairs through the survey evaluation questionnaire disseminated by the researchers. There is a total of 45 respondents who completed the survey form based on the random sampling method used by the researchers during the 2-days evaluation period.

III. RESULTS AND DISCUSSIONS

Results. The researcher produced a system that will serve as a tool for all the research papers made by the student and instructor/faculty researcher in BukSU. Results were gathered by the researchers thorough testing and evaluation made by the researcher.

Cheng, *et al.,* (2011) [9] a multi-functional online research portal must be developed to facilitate simulation-based research in order to provide research collaboration. This must simplify and streamline the management of the Research Unit of BukSU to enhance the overall research productivity. Once a paper is submitted to the portal, a tracking feature can help the author check progress of the paper by its status descriptions [16].

Realizing the importance and the value of Knowledge Management System (KMS), a research portal must have the following key features: initiation, facilitation and commercialization [2]. A web-based solutions for research portal must meet user demands for value-added digital resources and navigation assistance to enrich students' and teacher's educational and research experiences [21]. Morales, *et al.*, (2017), this is grounded on the need for colleges and universities to promote and practice research culture using technology [17].

This is the inspiration in the development of BukSU Research Portal, an online platform for simulating research activities. Thus, the following analysis further highlighted the positive effect of digitizing research and enhance the global image of the institution.

Analysis Table 1 shows the user type identity. The major respondents of the system were the students that represented the major groups of the user of the system. In the student groups, the researchers included non-4th year students as respondents since they would be the future user of the system. The faculty was second to largest number of user in this system. The least number was the Research and Development Unit specifically Dr.

Beverly B. Bicar, the Research Director which is the main stakeholder of the system.

Table 1: User Type Identity.

Type of User	Frequency	Percentage (%)
Research Unit	1	3.22%
Faculty / Researcher	29	64.44%
Student	15	33.33%

In order to measure the statistical significance of BukSU RRMS application, the researchers needed to measures the characteristics of the system in terms of Usability, Functionality, Reliability and Efficiency.

The researchers adopted a scoring procedure (Table 2) from the research paper entitled, "Cognitive Computing Where Big Data Is Driving Us" authored by Bangor, *et al.*, (2009) [6]. The acceptability range was divided into three: the acceptable, marginal, and not acceptable. The system would be acceptable if the agreed average range is from 70% to 100%. When the acceptability range is marginal, agreed average range is from 50% to 69% which means some requirements in the system were not met. Unfortunately, 49% below average range of the system means not acceptable.

The Table 3 presents the student assessment on average of usability which consists of the data gathered from different students on BukSU about the acceptability of the system. The total average percentage was 94.29% which is considered as acceptable by the students.

The Table 4 presents the faculty researcher assessment on average of usability which consists of the data gathered from different students on BukSU about the acceptability of the system. The faculty researcher accepted the system with the total average percentage of 100%.

The Table 5 presents the data gathered from the Research Director of Research and Development Unit of BukSU about the acceptability of the system based on its usability. The Research Unit accepted the system with the total average percentage of 100%.

Table 2: Scoring Procedure.

Agree Average Range	Acceptability Range	Quantitative Description
70% - 100%	Acceptable	The system is acceptable.
50% - 69%	Marginal	Some requirements of the system were not met.
49% below	Not Acceptable	The system is not acceptable.

Table 3: Student Assessment on Average of Usability.

Usability	Agreed Frequency	Disagreed Frequency	Percentage
The system adopts proper labeling of buttons, links, and text fields.	15	0	100%
The menus and buttons are easy to understand.	15	0	100%
The menus and buttons perform its function properly.	14	1	93%
The combination of color used in the system is pleasant for the user.	12	3	80%
The system can perform its function easily.	15	0	100%
The instructions provided are easy to follow.	15	0	100%
The system is easy to operate and control by the user.	13	2	87%
Total Average Percentage (%)			94.29%

Table 4: Faculty Researcher Assessment on Average of Usability.

Usability	Agreed Frequency	Disagreed Frequency	Percentage
The System adopts proper labeling of buttons, links, and text fields	29	0	100%
The menus and buttons are easy to understand.	29	0	100%
The menus and buttons perform its function properly.	29	0	100%
The combination of color used in the system is pleasant for the user.	29	0	100%
The system can perform its function easily.	29	0	100%
The instructions provided are easy to follow.	29	0	100%
The system is easy to operate and control by the user.	29	0	100%
Total Average Percentage (%)			100%

Table 5: Research Unit Assessment on Level of Usability.

Usability	Agreed Frequency	Disagreed Frequency	Percentage
The System adopts proper labeling of buttons, links, and text fields.	1	0	100%
The menus and buttons are easy to understand.	1	0	100%
The menus and buttons perform its function properly.	1	0	100%
The combination of color used in the system is pleasant for the user.	1	0	100%
The system can perform its function easily.	1	0	100%
The instructions provided are easy to follow.	1	0	100%
The system is easy to operate and control by the user.	1	0	100%
Total Average Percentage (%)			100%

The Table 6 presents the student assessment on average of functionality. As presented in the table above, the total average percentage was 88.89% which is still considered as acceptable by the student based on functionality.

The Table 7 represents the faculty researcher assessment on average of functionality. There were fourteen (14) faculty researcher who agreed with those three (3) statements representing the functionality. As presented by the table above, the total average percentage was 100% which is obviously considered as acceptable by the faculty researcher.

Table 8 presents the Research Unit assessment on average of functionality. The Research Director of Research Unit and Development of BukSU accepted the system based on its functionality. As presented by the table above, the total average percentage was 100%.

The Table 9 shows the data gathered from different students of BukSU. There were four (4) statements provided about the system to fifteen (15) different students of BukSU. The result came up to 98.33% total average which means that the BukSU Research Record Management System was acceptable by the students based on the systems' reliability.

Table 10 shows the data gathered from the different faculty researchers of BukSU. There were four (4) statements provided about their system to fourteen (14) faculty researchers of BukSU. As presented by the table above, the total average percentage was 100% which is obviously considered as acceptable by the faculty researcher.

Table 11 presents the data gathered from the Director of Research and Development Unit in BukSU about the acceptability of BukSU Research Record Management System based on its reliability. As a result, the total average percentage consists of 100% which means that the system was highly acceptable based on its reliability.

Table 6: Student Assessment on Average of Functionality.

Functionality	Agreed Frequency	Disagreed Frequency	Percentage
The system provides information about research papers.	11	4	73%
The system provides access code to make you secured.	15	0	100%
The researchers can upload their research paper in the system.	14	1	93%
Total Average Percentage (%)			88.89%

Table 7: Faculty Researcher Assessment on Average of Functionality.

Functionality	Agreed Frequency	Disagreed Frequency	Percentage
The system provides information about research papers.	29	0	100%
The system provides access code to make you secured.	29	0	100%
The researchers can upload their research paper in the system.	29	0	100%
Total Average Percentage (%)			100%

Table 8: Research Unit Assessment on Average of Functionality.

Functionality	Agreed Frequency	Disagreed Frequency	Percentage
The system provides information about research papers.	1	0	100%
The system provides access code to make you secured.	1	0	100%
The researchers can upload their research paper in the system.	1	0	100%
Total Average Percentage (%)			100%

Table 9: Student Assessment on Average of Reliability.

Reliability	Agreed Frequency	Disagreed Frequency	Percentage
The system provides option whether the researcher restrict the user from downloading their works or not.	15	0	100%
The system provides accurate information.	15	0	100%
The system can generate accurate reports.	14	1	93%
The system processes the data accurately.	15	0	100%
Total Average Percentage (%)			98.33%

Table 10: Faculty Researcher Assessment on Average of Reliability.

Reliability	Agreed Frequency	Disagreed Frequency	Percentage
The system provides option whether the researcher restrict the user from downloading their works or not.	29	0	100%
The system provides accurate information.	29	0	100%
The system can generate accurate reports.	29	0	100%
The system processes the data accurately.	29	0	100%
Total Average Percentage (%)			100%

Table 11: Research Unit Assessment on Average of Reliability.

Reliability	Agreed Frequency	Disagreed Frequency	Percentage
The system provides option whether the researcher restrict the user from downloading their works or not.	1	0	100%
The system provides accurate information.	1	0	100%
The system can generate accurate reports.	1	0	100%
The system processes the data accurately.	1	0	100%
Total Average Percentage (%)			100%

Table 12 shows the student assessment on average of efficiency. The total agreed frequency was fourteen (14) students and only one (1) student disagreed. The total average percentage was 93.33% which means that the system was acceptable by the student based on the systems' efficiency.

Table 13 presents the data gathered from the different faculty researcher in BukSU about the acceptability of the system based on its efficiency. As a result, the total average percentage was 100% which means that those fourteen (29) faculty researchers accepted the system based on its efficiency.

The Table 14 shows the data gathered from the Director of Research and Development Unit in BukSU about the acceptability based on the systems' efficiency. The outcome have shown that the total average percentage was 100% which means that the Research Director of Research and Development Unit was highly accepted the system based on its efficiency.

Table 15 presents the overall acceptability evaluation conducted by the researchers on different characteristics of BukSU RRMS. These revealed that the system is very acceptable with a total of 97.90 acceptability percentage.

Discussion. This research was able to develop the BukSU Research Record Management System in order to provide a functional system for all the researchers in BukSU which offers reliable data.

Fig. 3 is the BukSU Research Record Management System Use-Case Diagram; it shows the list of actions and events typically define the interactions between different users and the system to achieve a goal. It also shows the boundaries and limitations of the system administrator, researcher instructor or faculty, student researcher, and the user of the system itself.

Table 12: Student Assessment on Average of Efficiency.

Efficiency	Agreed Frequency	Disagreed Frequency	Percentage
The execution and response time is accurate.	14	1	93%
Total Average Percentage (%)			93.33%

Table 13: Faculty Researcher Assessment on Average of Efficiency.

Efficiency	Agreed Frequency	Disagreed Frequency	Percentage
The execution and response time is accurate.	29	0	100%
Total Average Percentage (%)			100%

Table 14: Research Unit Assessment on Average of Efficiency.

Efficiency	Agree Frequency	Disagreed Frequency	Percentage
The execution and response time is accurate.	1	0	100%
Total Average Percentage (%)			100%

Table 15: Assessment Summary.

Acceptability Percentage						
Summary	**Research Unit**	**Faculty Researchers**	**Student**	**Overall Percentage**	**Acceptability Range**	**Quantitative Description**
System Usability	100%	100%	94.29%	98.09%	Acceptable	The system is acceptable.
System Functionality	100%	100%	88.89%	96.30%	Acceptable	The system is acceptable.
System Reliability	100%	100%	98.33%	99.44%	Acceptable	The system is acceptable.
System Efficiency	100%	100%	93.33%	97.78%	Acceptable	The system is acceptable.
Total Average Percentage				97.90%	Acceptable	

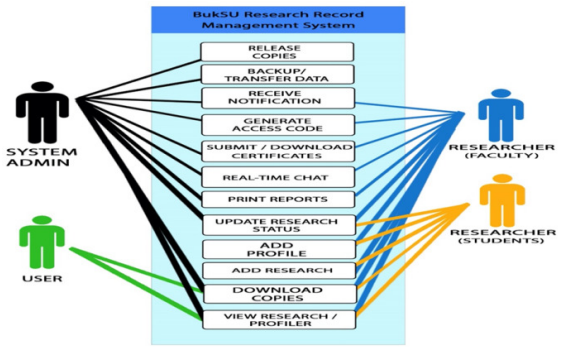

Fig. 3. BukSU Research Record Management System Use-Case Diagram.

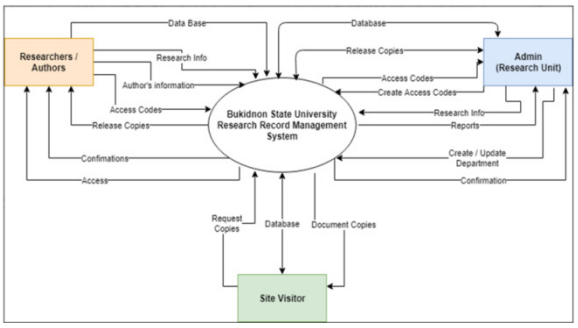

Fig. 4. BukSU Research Record Management System Context Diagram.

Fig. 4 is the Bukidnon State University's Research Record Management System Context Diagram showing the endpoints which lays the system boundaries.

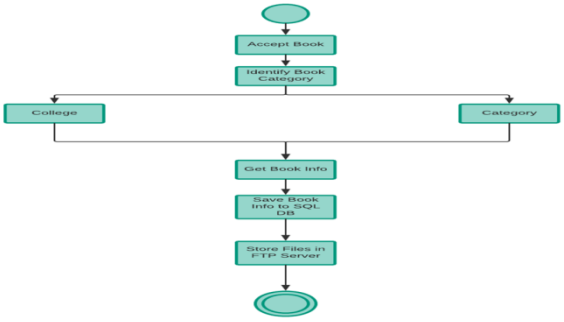

Fig. 5. Adding of Research Papers Activity Diagram.

Fig. 5 is the Adding of Research Papers Activity Diagram which shows the flow on adding a research paper.
Submission of paper required to input data: College or Category.

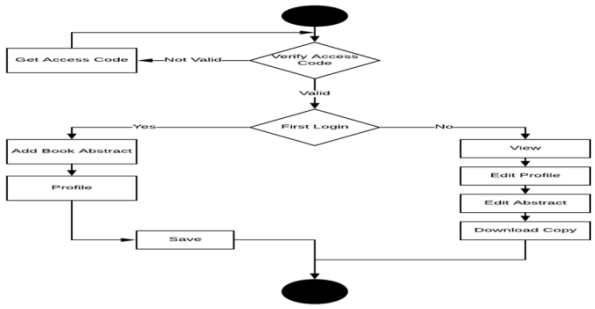

Fig. 6. Research Updating Profile Activity Diagram.

Fig. 6 is the Research Updating Profile Activity Diagram which shows the procedures on how to update profile in this system after verifying access codes.

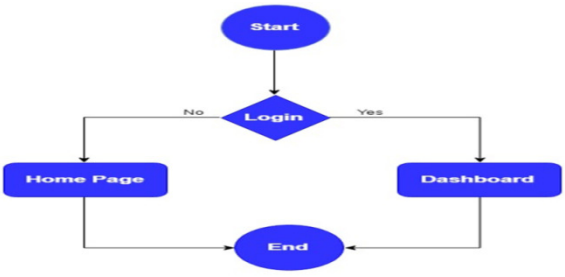

Fig. 7. Activity Diagram for Dashboard Access (Admin and Faculty).

Fig. 7 is the Activity Diagram for Dashboard Access (Admin and Faculty) which shows the how to access administrator and research instructors' dashboard.

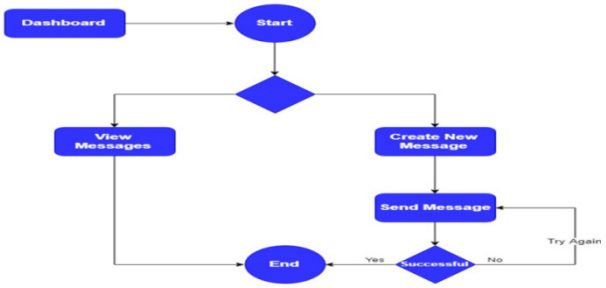

Fig. 8. Activity Diagram for Viewing and Creating Message.

Fig. 8 shows the series of action on how to access these features.

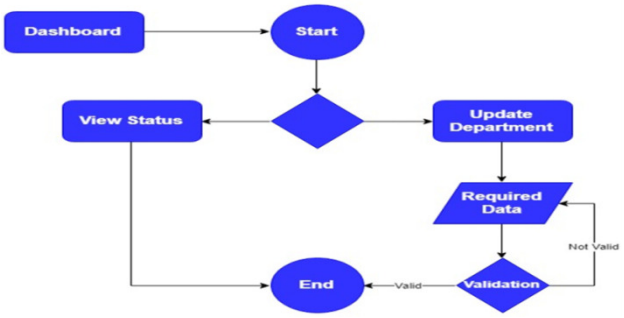

Fig. 9. Update Department.

Fig. 9 shows the series of acts on updating list of departments registered in the system.

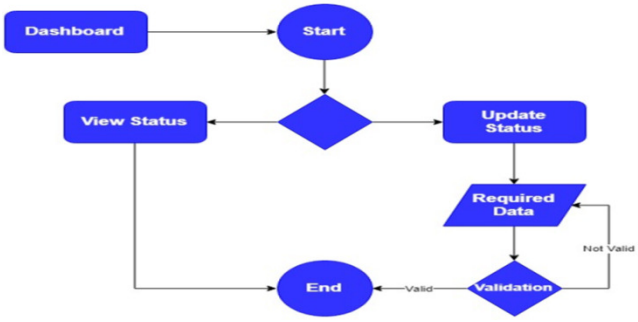

Fig. 10. Updating Research Status.

Fig. 10 shows the activity diagram of updating research status by the administrator.

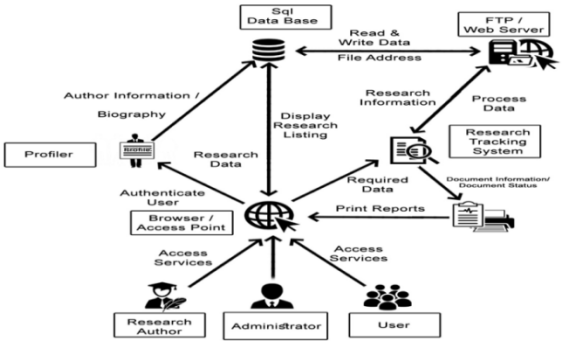

Fig. 11. BukSU RRMS Physical Architecture.

Fig. 11 shows the complete physical layout of the Bukidnon State University's Research Record Management System and its components in a schema.

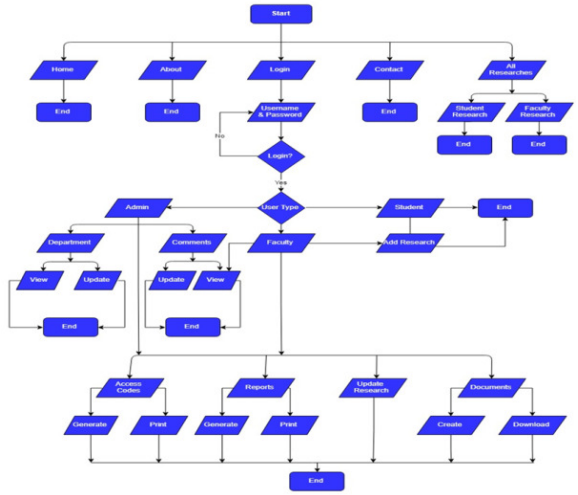

Fig. 12. BukSU RRMS Flow Chart.

Fig. 12 shows the flow chart diagram of BukSU Research Record Management System. The following Fig. shows the user interface of the software.

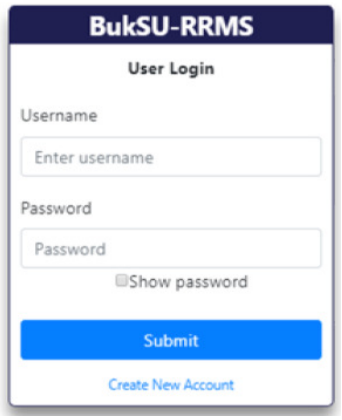

Fig. 13. Login Page.

Fig. 13 shows the login page for the administrator, instructor or faculty, and the students for them to access the dashboard and other functional webpages.

Fig. 14. Admin Home Page.

Fig. 14 shows the home page for admin of the BukSU Research Record Management System.

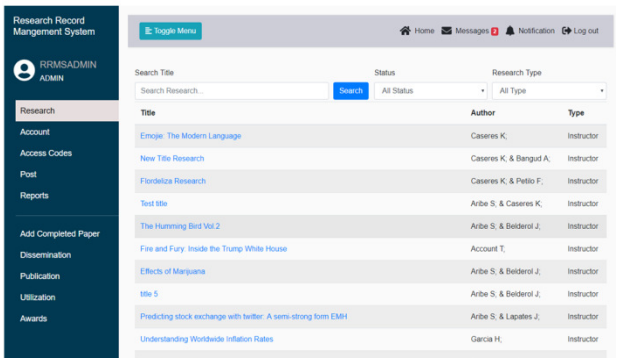

Fig. 15. Administrator Dashboard.

Fig. 15 illustrates all the function of administrator where can perform different task like: sending message, generate access key, verify the submitted research of instructor, etc.

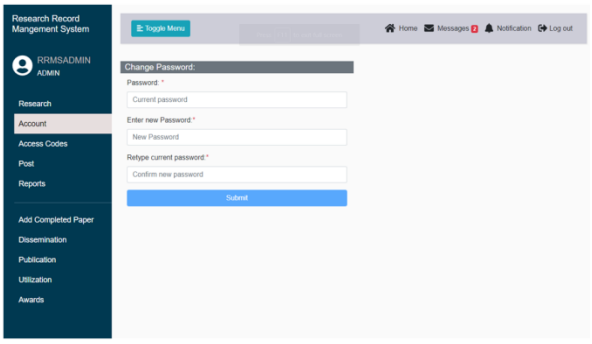

Fig. 16. Administrator Update Account.

Fig. 16 shows how the system performs changing or updating the Admin account and password.

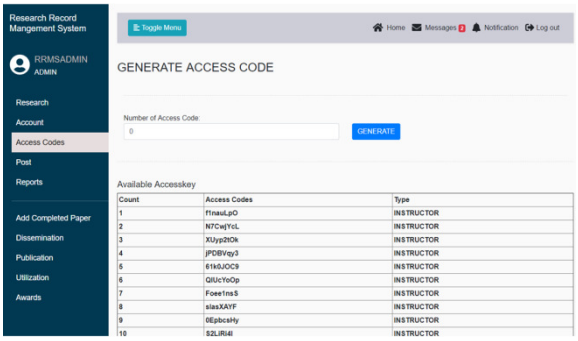

Fig. 17. Administrator Access Codes.

Fig. 17 shows how to generate access key for the instructor account.

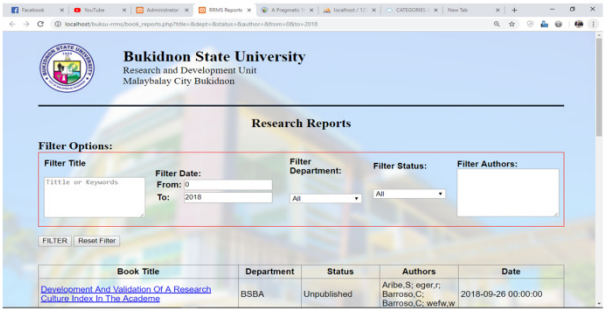

Fig. 18. Administrator Reports.

Fig. 18 shows how to create reports which can also prints custom list of data.

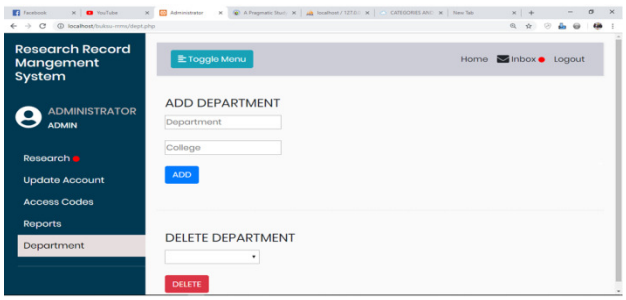

Fig. 19. Administrator Add/Delete Department.

Fig. 19 shows how to perform the adding and deleting list of colleges if in case there are some changes in the near future.

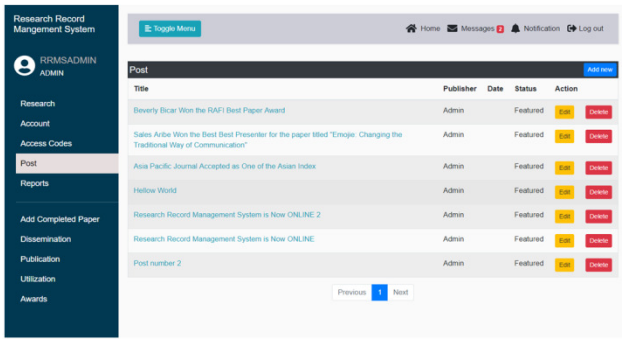

Fig. 20. Administrator Create/Update Post.

Fig. 20 allows the administrator to create, edit and delete posts or announcement.

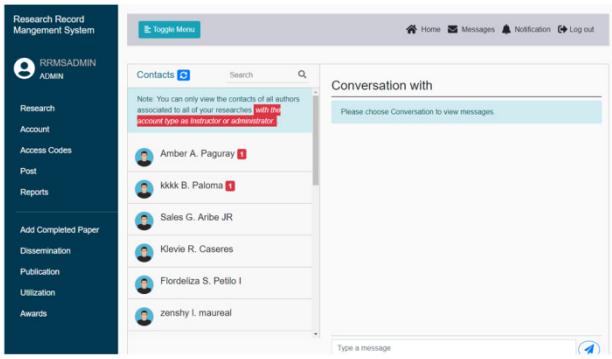

Fig. 21. Administrator Chat Page.

The chat interface was shown in Fig. 21 which allows the administrator, faculty and co-authors to communicate each other.

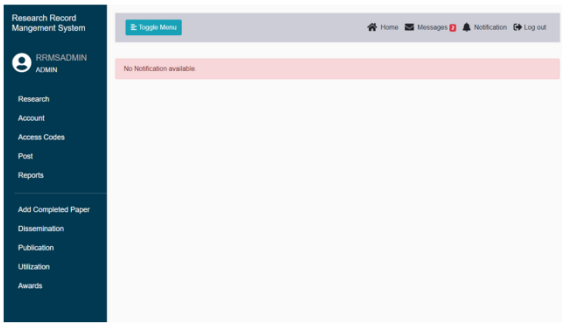

Fig. 22. Administrator Notification Page.

Fig. 22 shows the user's notification.

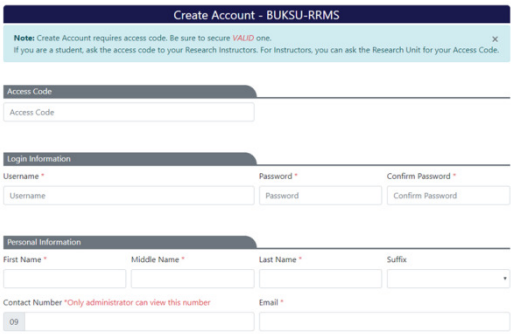

Fig. 23. Create Account for Instructor.

Fig. 23 allows the user through the University instructor or thesis adviser to create an account, creating account requires access codes.

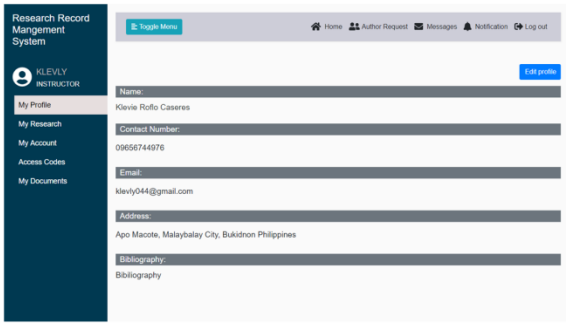

Fig. 24. User Dashboard/Profile.

Fig. 24 shows the dashboard of instructor where it will display different functions of instructor. The main function when an instructor access the system is the "My Profile" function, this gives the user to update its profile.

Fig. 25 shows the interface of the researches created by the author. The research function is divided into two, namely "Completed" and "On-process" researches.

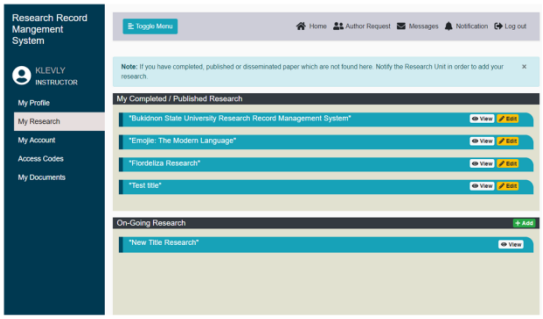

Fig. 25. User Research List.

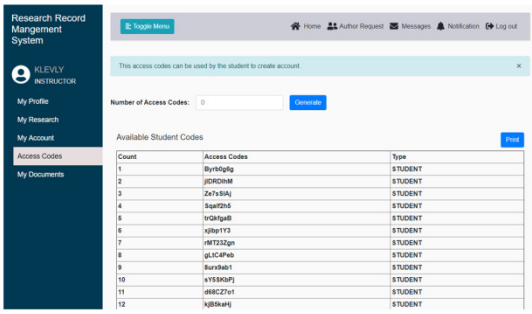

Fig. 26. User Access Codes.

Fig. 26 performs the generating of access codes for the student to activate their account.

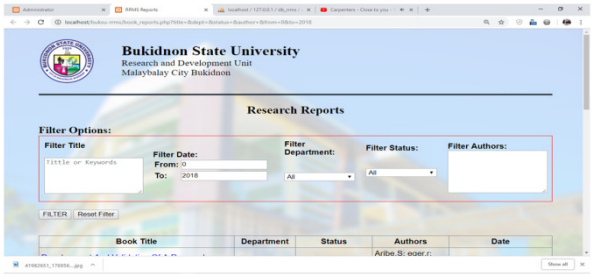

Fig. 27. User Report.

Fig. 27 shows how to create reports and print the custom list of data that will be needed for reporting.

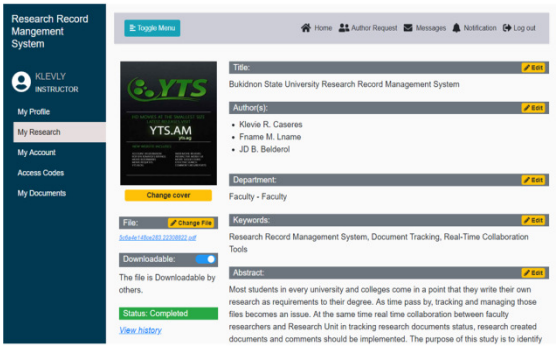

Fig. 28. User Completed Research

Fig. 28 shows the details of author's completed research. This will allow the author to update the completed research.

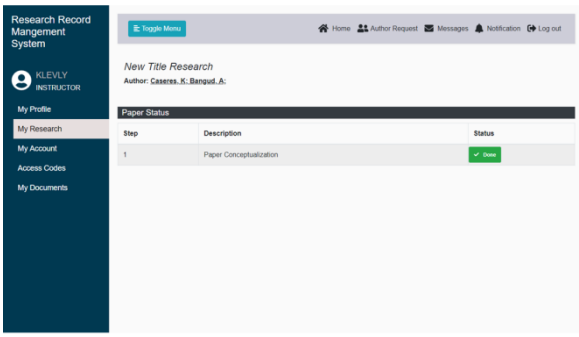

Fig. 29. User On-going Research.

Fig. 29 shows the complete list of on-going research paper of an instructor and its latest status.

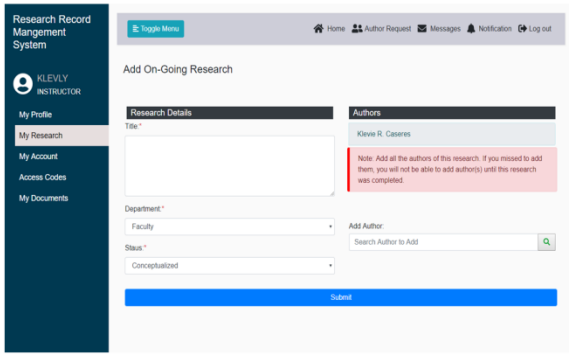

Fig. 30. User Add Research.

Fig. 30 allows the instructors to add their own research title. Automatically, the status of the added title will be conceptualized.

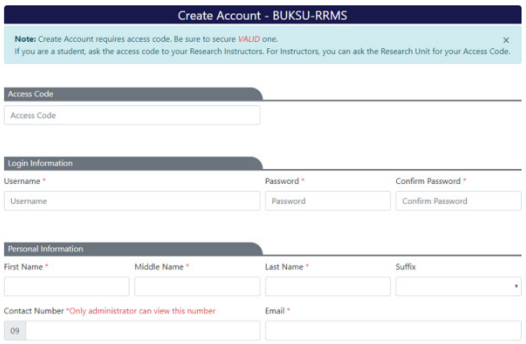

Fig. 31. Student Create Account.

Fig. 31 allows the user to create an account same with Fig. 23.

Fig. 32. Student Home Page.

Fig. 32 shows the home page for students of the BukSU Research Record Management System.

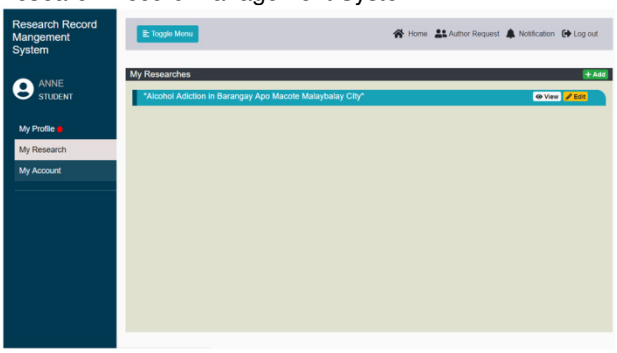

Fig. 33. Student My Research Page.

Fig. 33 allows the student to submit their research paper.

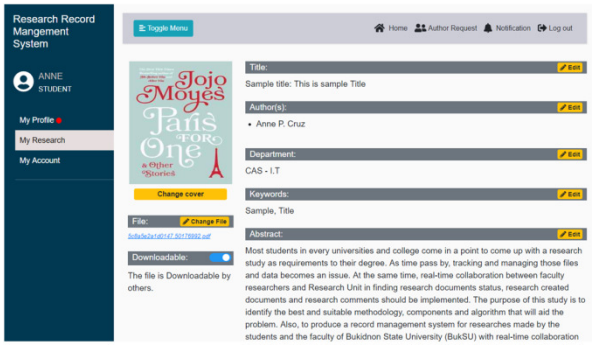

Fig. 34. Student Research Details Page.

Fig. 34 shows the details of the student research, it allows the user to update the content of the research.

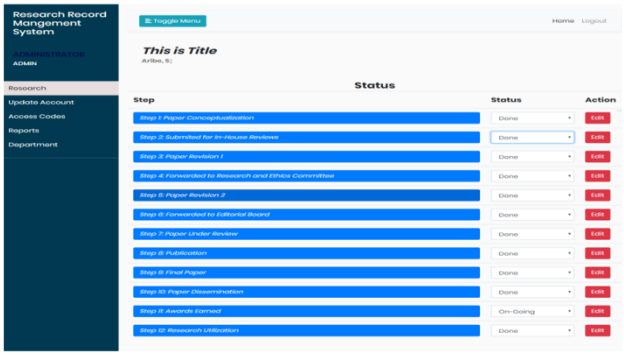

Fig. 35. Student Research Status

Fig. 35 illustrates the sequential steps of publishing a submitted research paper of an instructor.

Fig. 36. Certificate of Utilization

Lastly, the web application is currently being utilized by the University as shown in Fig. 36.

IV. CONCLUSION

The response from the end user of BukSU RRMS during the testing process was evaluated and produced good feedback which implied that the system has met its objectives. Based on the process of developing the system and data gathered during evaluation, the researchers concluded that the design and development of the Research Record Management System has complied with the expected functional requirements. The Research Record Management System can is currently being used by the Research Unit of Bukidnon State University and the overall average was 97.90% which means that all of the respondents accepted the system in terms of its usability, functionality, reliability, and efficiency.

V. FUTURE SCOPE

This study has a number of limitations which are recommended for future enhancement and studies. Firstly, the system may need to give additional collaboration functionality between students and instructors. Secondly, the system may needed to be implemented on a bigger and faster server. And lastly, the system should implement content checking and comparison on every document.

Conflict of Interest: The paper submitted is original and not under consideration for publication elsewhere. All authors have approved the paper for release and are in agreement with its content. Likewise, the Bukidnon State University – Research Unit (the beneficiary) who currently utilize the software as the outcome of this paper, gives go-signal to allow this paper for publication in any international journal.

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