University Research Production and Utilization Management System

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Abstract *– The process of creating a research proposal and submitting it for final approval is a very time-consuming process as any proposal may require multiple parties to review and authorize it and every step. With this, the main objective of the paper is to design and implement a research proposal submission management system. To accomplish the set of objectives, the researcher utilized the Web Development Life Cycle as its process model. This cycle includes the gathering, planning, design, development, testing and maintenance and update. The university research production and utilization management system were developed to eases out the submission processing, collection, tracking and management of paper submissions of the research center. Paper information can be received, authenticated, tracked, stored, and distributed electronically.*

Keywords *– Management System, Online Submission, Research Production, Research Utilization.*

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INTRODUCTION

Traditional paper-based submission had introduced various problems to academic staff and researchers. Online submission provides flexibility for submission regardless of physical location, save up physical space by using electronic copy of submission and ease evaluation process of academic staffs. Email provides a solution towards proposal and other documents' submission online. However, organizing submissions in manual process is time consuming and inefficient. The is why research production and utilization management system was developed.

A research production and utilization management system approach for the system that allows creation, editing, submission, and approval of proposal on a website. The management system will also be able to track any updates and status of each proposal, allow notification to be send to related parties.

With the use of management system, staffs will be able to manage the flow of proposal submission and utilization in a more organized manner. Researchers will go through a proper procedure to create a proposal, and this ensure the proposal consist of all required details before submission for approval. This provides a consistent format or layout for proposal submission and utilization.

The system will provide three user accounts: an administrator, authors account and reviewer's account. The administrator account is designated for the research department staff with the capability managing the research production, assigned to the reviewers and return the manuscript to the authors; while authors account is for the future researchers that can create a new proposal and submit it with the corresponding author/s; and lastly the reviewers account with the capability to evaluate, review, comment and have a suggestion on every research proposal. Reviewers are allowed to upload the reviewed manuscript to the system. Generating report is also included to the research production and utilization management system.

To pursue the university's commitment to quality, the Center for Research and Innovation of the Lyceum of the Philippines University, has become the vital instrument in achieving the mission – vision of the university through institutionalizing research and strengthening the research culture and capability [1]. Research is one of the core functions of a teaching and non-teaching personnel. It is not just a requirement but through research, it can provide solutions to most of the problems. Management systems is one of the products of research, it makes recording and reporting easier, faster, and more accurate compared to manual process or record keeping.

Web development has become essential for business to have a high-functioning website or web application to cater to the digital requirements of customers. Almost all companies, no matter the field of operation,

are focusing on creating a well-designed site for marketing their services. But the web development process does not only involve coding. With a hundred aspects that need to be taken into consideration, it becomes imperative to follow a structured process to avoid problems [2].

The conventional manual approach of keeping track of research papers is a time consuming and inaccurate process, as most researchers are asking the status of their research. This old-fashioned system is a very annoying task, and it is challenging for the research staff to monitor all the research production produced every year. This system was found inefficient in tracking and has a lot of weaknesses such as misuse of the paper log records, loss of paper, absence of an in-out transaction record and misplacing of paper [3].

In addition, to the research related faced by the researchers and the university is that there is no existing software for monitoring. Thus, any unreliable management system can cause many false alarms, in turn causing dissatisfaction of the researchers. That is why to design and develop a platform of university research production and utilization management system is a very big help to the research department personnel, to the authors and reviewers [4]. This system increases the redundancy, improving the accuracy and reliability of the research production.

With this, developing a reliable system which is truthful in data capture and displaying them is not a factor, yet there are certain limitations for on this management system.

Limitations of any study concern potential weaknesses that are usually out of the admin's control or other factors. In this respect, a limitation is an 'imposed' restriction that includes The process of Research Approval Form and Certificate of Completion Form, and Plagiarism Test.

OBJECTIVES OF THE STUDY

The main objective of the paper is to design and implement a research proposal submission management system. Specific objectives of the study are: To develop a system that will support the Research Productivity of the University in terms of: (a) **Research Productivity** - an interface where all research production procedure can be processed and monitored by faculty members/non-teaching staff and the Research Center in terms of Research Proposal Approval, Research Progress Monitoring for payment and Research Completion Monitoring; (b) **Research Dissemination** – an interface where all research dissemination can be processed and monitored by faculty members/non-teaching staff and the Research Center in terms of: **Research Presentation** – in interface for all research local and international presentation application, approval, monitoring, and incentive payment, **Research Publication** – in interface for all research local, international, Scopus-indexed, and Clarivate Analytics-indexed journal publication application, approval, monitoring and incentive payment. **Research Utilization** - an interface where all research findings are documented for its utilization for dissemination to intended beneficiary for policy- development, basis for program, action plan and Strategies, Practice. (c) To create a database that will manage each researcher's research proposal submission and allow access by reviewers to access those files submitted by the researchers. And lastly, (d) To use PHP, Javascript, phpMyAdmin, and SAP Crystal Report in developing the university research production and utilization management system for Lyceum of the Philippines University - Batangas.

MATERIALS AND METHODS

To accomplish the set of objectives, the researcher utilized the Web Development Life Cycle as its process model. The Web Development Life Cycle includes the gathering, planning, design, development, testing and maintenance and update [5].

The researcher used the web development life cycle to implement a management system for the Research Office. Since the goal of the researcher is to develop a friendly user website, the researcher followed the step-by-step process which consists of Research, planning, designing, content, development, testing, and maintenance.

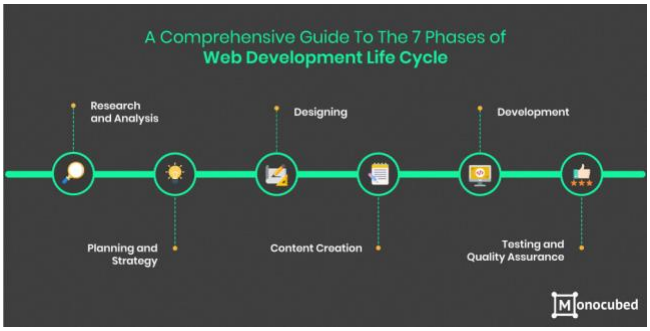

Figure 1. Web Development Life Cycle

RESEARCH

The researcher experienced how challenging for the research staffs, authors, and reviewers to monitor, followed up, and to remind every single time, so that the researcher had an idea of what system can help the users to do it faster and easier. The researcher gathered suggestions to the future users of the system. The researcher looked for the similar study and analyzed the content, design, and requirements that are needed to implement the proposed system.

PLANNING

The planning stage involves strategizing all the aspects of the website including design, technology, content, and marketing [6]. Based on the gathered suggestions, informed decisions are made about the structure and features of the website. The researcher decides the content structure, wireframe (schematics and rough designs), choosing the technology stack and software development methodology. The researcher identifies first the main purpose and beneficiaries of the website to be developed. Based on the suggestions of the users the researcher constructed what title will be suitable for the proposed system. The researcher consulted her adviser about the proposed topic. During the discussion the researcher discussed what will be the scope and limitation of her study. Her adviser suggested to discuss the manual process of research production so that the adviser may suggest what will be the whole process when the proposed management system will be implemented. With all the information gathered, the researcher was able to identify the needs to provide a perfect solution. The researcher and adviser agreed that it is a great idea, that's why the researcher proposed the university research proposal and utilization management system for the Center for Research and Innovation Office.

DESIGNING

The web design stage involves designing website layout and brings in the creative UI-UX designers to the forefront [7]. The researcher used Adobe Photoshop CC software to layout a rough sketch, to get a feel of the design of the website. The purpose of the layout is to present an information structure, enabling a visual tour of the content and base features for your clients. The researcher designed an interactive website that caters to the users. She also includes some buttons, tabs, menus, dashboards, color themes, typography, and graphics to create a base layout of the website to attract users.

CONTENT CREATION

Creating a communication channel through the user interface is the main aim of the content creation stage. It involves providing a relevant information in a friendly user and attractive manner [8]. The researcher adds some creative headlines, formatting, line editing, writing, and updating texts go on throughout the web development lifecycle.

DEVELOPMENT

The development phase involves the actual building of the website. To accomplish this stage the researcher developed the client-side and server-side. This stage includes the front and end web development. The researcher used HTML, CSS, and a scripting language. JavaScript are used to create a user-friendly site. The server-side encompasses the process of developing the server-side app, creating database, writing the application logic, and integrating server and client-side functions.

TESTING

The researcher conducted a test to eliminate any bugs in the system. The research staffs, reviewers, and authors perform repeated testing methods such as functionality, usability, compatibility, and performance of the website. The web system was hosted through GoDaddy.com. The GoDaddy is the world's largest and trusted domain registrar that empowers people with creative ideas to succeed online [9].

MAINTENANCE

Continuous feedback from user interaction lets the researcher know the scopes of improvement. Accordingly, the web application development life cycle is executed to make the necessary modifications. Apart from this, regular maintenance and updates are crucial to keep the site functioning perfectly and engage new users. The web system will have an occasional update of content checking and data maintenance. This will be monitored by the administrator and will be open for additional functionality in the future.

DATA FLOW DIAGRAM

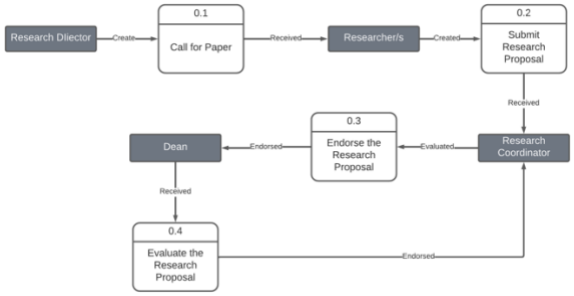

Figure 2. Call for Paper Processed

Figure 2 shows the manual process for call for paper. Research Director create a Memo for Call for Paper. The research staff will disseminate the memo to the respective colleges. The faculty and non-faculty will be informed about the call for paper. The

researchers will now proceed to create a new proposal and then submit it to the research coordinator for evaluation. Research coordinator will now endorse the research proposal to the Dean/Department Head. They will evaluate the research proposal and then endorse it to the research coordinator.

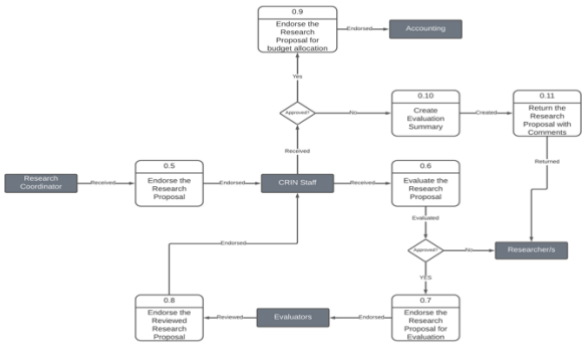

Figure 3. Evaluation Processed

Figure 3 shows the manual process for papers' evaluation. The Research Coordinator will endorse the research proposal to the CRIN staff. The staff will evaluate the research proposal if it is not approved the research proposal will return to the researchers. If the research proposal is approved, it will now proceed to the evaluation process. The CRIN staff will endorsed the research proposal to the statistician and Research Director for approval. If it is not approved the CRIN Staff will return the research proposal to the respective authors/researcher/s and if it is approved the CRIN staff will endorsed the research proposal to the accounting for budget allocation.

Figure 4. Budget Allocation Processed

Figure 4 shows the manual process for budget allocation. Once the Accounting received the research proposal and approved for budget allocation, accounting staff will endorse the research proposal to the president for final approval. The president staff will return the approved research proposal to the CRIN staff to inform the respective authors/researcher/s. Once the author received the approved research proposal, author will now proceed to create the full paper and then submit it to the CRIN Staff.

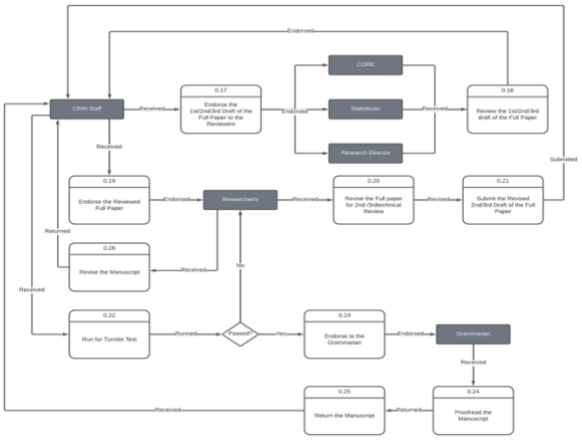

Figure 5. Technical Review Processed

Figure 5 shows the manual process for technical review of the manuscript. CRIN staff will received the full paper and then assign a reviewer for technical review. Once the CRIN Staff informed the reviewers, they will now proceed to review the Full paper and the return it to the CRIN Staff. CRIN Staff will evaluate if there is a comments or suggestions to the full paper. If there's a comment or suggestion the CRIN staff will endorsed the result of the technical review paper to the authors. Authors will revise the comments and suggestions and submit it to the CRIN Staff. If there is no comment or suggestion from the reviewers, the CRIN staff will run a plagiarism test and if the result is 20% and above the CRIN Staff will return the manuscript to the authors for revision. If the result is 20% and below CRIN staff will endorsed the full paper to the grammarian for proofreading. After proofreading the grammarian will return the manuscript to the CRIN Staff.

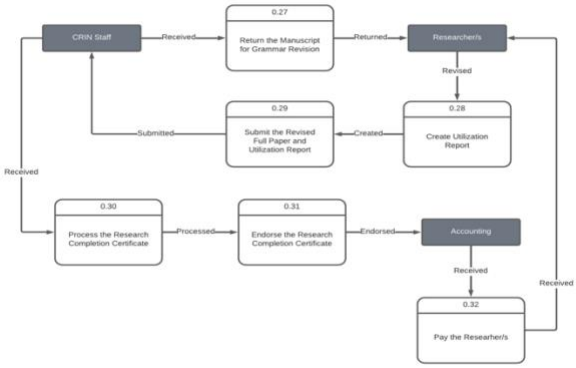

Figure 6. Payment Endorsement Processed

Figure 6 shows the manual process for payment endorsement. CRIN Staff will receive the proofread manuscript and then return it to the respective author/s. Author/s will revised the manuscript and then submit it

to the CRIN staff together with the utilization report. Once the CRIN staff will receive the Final draft of the full paper and utilization report, the CRIN staff will process the Certificate of Completion and then endorsed it to the accounting office for payment.

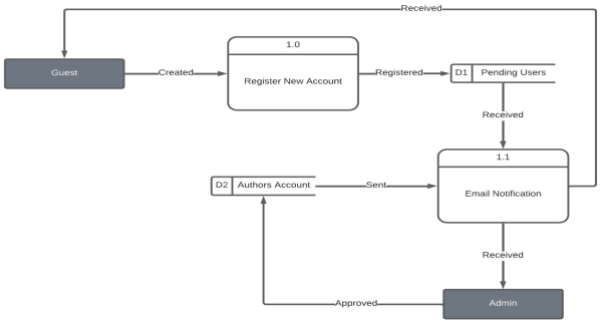

Figure 7. Guest Create Account

Figure 7 shows the proposed management system data flow diagram for the Guest user. This are the personnel who can navigate through the system and access all the available data. To propose a research paper the guest, need to register to the system to become an author. Once the guest creates an account the admin will notify for the pending user. Admin will approve the pending user and then the guest will be notified about the approval. After the approval the guest will become an author.

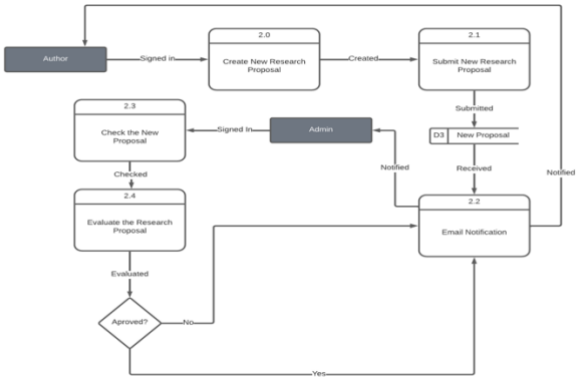

Figure 8. Submit New Research Proposal

Figure 8 shows the proposed management system data flow diagram for the new research proposal submission. Authors are personal which create and submit a proposal for approval, mainly current employed in the institution. Create a proposal is the first step in the process of proposal approval. University Research Production and Utilization Management System plans to include a step-by-step proposal creation form, to assist researchers on creating a proposal for submission. A file attachment is available, allowing user to attach relevant documents for proposal submission. After submission of proposal, researcher will be able to view the proposal in his/her My papers, with a pending status under list of New Papers. The author will then be able to view the proposal he/she submitted, download the attachment.

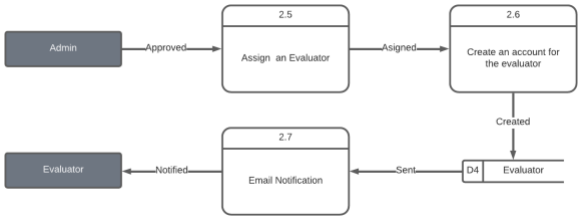

Figure 9. Evaluator Create an Account

Figure 9 above shows the proposed management system data flow diagram for the evaluator create an account**.** Upon completion of all steps, administrator will be the one to assign a research proposal to the reviewers. The admin will assign an evaluator and then create an account for them. The evaluators will receive a notification about the assignment.

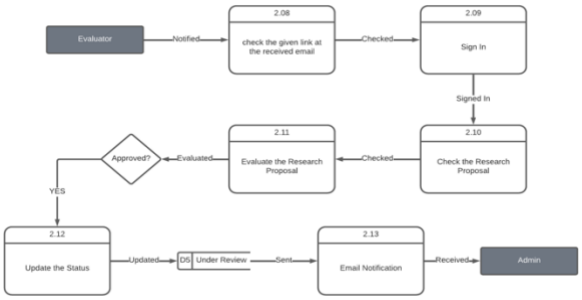

Figure 10. Evaluation Process

Figure 10 shows the proposed management system data flow diagram for the evaluation process. When a reviewer received a new research proposal. Reviewers can see all the papers that are assigned to them for evaluation process which will receive, evaluate, and update the status if it is accept as is, accept with very minor revision, requires minor corrections, requires moderate revision, and reject the proposal. Reviewers will notify of the submission of the proposal, and reviewer's papers for evaluation will also be updated to reflect the received of the proposal.

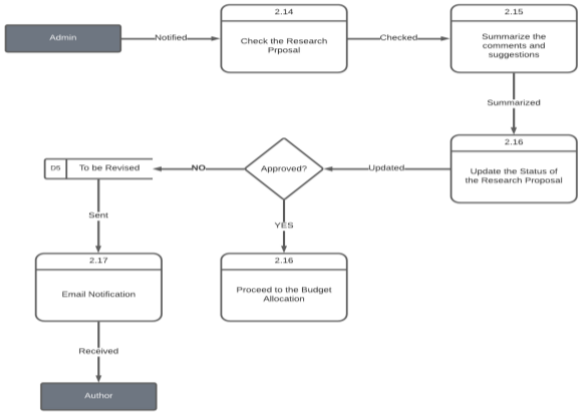

Figure 11. Admin Received the Evaluated Research Proposal

Figure 11 shows the proposed management system data flow diagram for the evaluated research proposal. The admin will notify about the evaluated research proposal. The admin will evaluate and summarized the comments and suggestions of the evaluators. The final status of the research proposal will update by the admin. If it is accepted the admin will proceed for the budget allocation and if it rejected or need a revision the author will notify and then revised the research proposal and resubmit it again to the system.

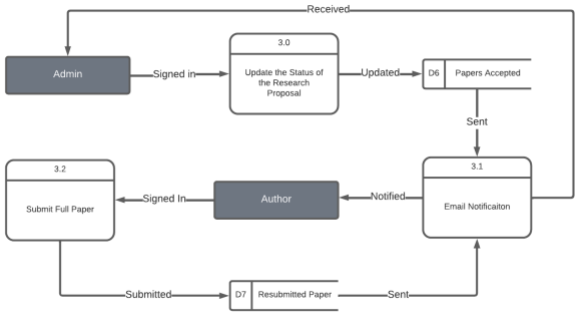

Figure 12. Approval of the Research Proposal Process

Figure 12 shows the proposed management system data flow diagram for the approval of the research proposal process. The admin will update the status of the research proposal and it will reflect at the papers accepted from the author's account. The author will now proceed to submit the full paper.

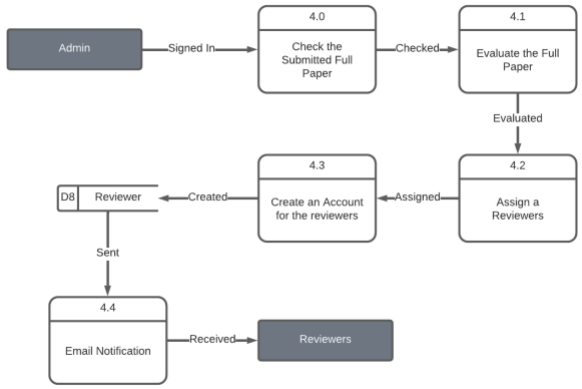

Figure 13. Assign Reviewers

Figure 13 shows the proposed management system data flow diagram for the assignment of the reviewers. The admin received the full paper submission and then evaluate the full paper and assign a reviewer. The admin will create an account for the reviewers and then the reviewers received an email notification about the assignment of the full paper.

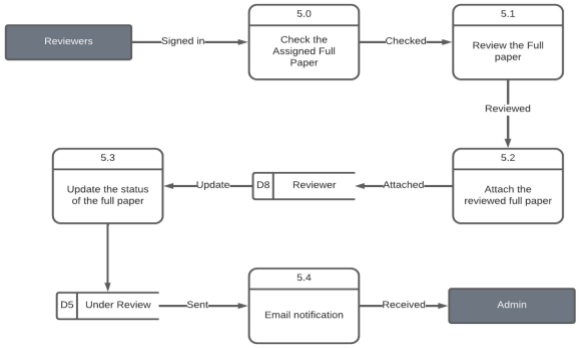

Figure 14. Review the Assigned Full Paper

Figure 14 shows the proposed management system data flow diagram for the review of the assigned full paper. The reviewer will log in to the system by the default account given by the admin. The reviewer will check and review the full paper, after the review, the reviewer will upload the full paper with comments and suggestion. The reviewer needs to update the status of the full paper if it is accepted or need a revision.

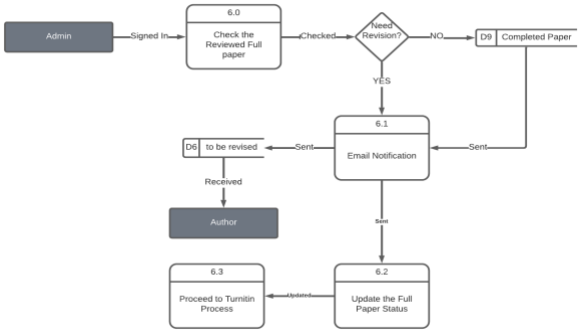

Figure 15. Completed Paper

Figure 15 shows the proposed management system data flow diagram for the process of the completed paper. The author will check the reviewed full paper if it is needs to revise or approved. Once the admin updates the status of the paper the author will receive a notification email. If the full paper is accepted the admin will proceed to the Turnitin process.

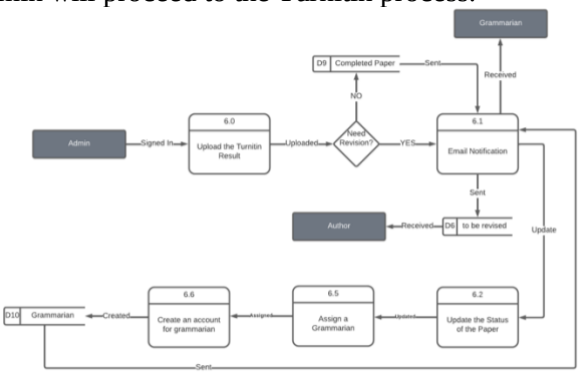

Figure 16. Create An Account for Grammarian

Figure 16 below shows the proposed management system data flow diagram for the assignment of the grammarian. The admin upload the Turnitin result and if it is 20% and above the admin will update the status of the paper and the author need to revise it, and if the result is 20% and below the paper will be reflected at the completed paper. The admin will update the status of the paper and the assign a grammarian. After that, the admin will create an account for the grammarian.

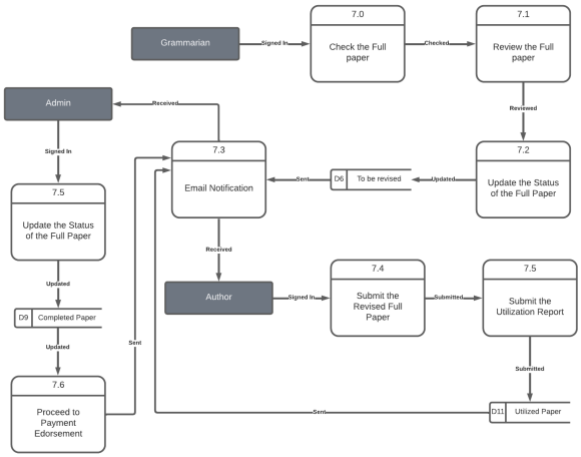

Figure 17. Grammarian and Research Proposal Completion

Figure 17 shows the proposed management system data flow diagram for the grammarian and completion process. When the manuscript is already done in reviewing process, the admin will check the decision of the reviewers if it is accept as is and accept with minor corrections, if it is accept with minor correction, the admin will update the status of the manuscript so that the author will notify and revised the full paper and if it is accept as is, the admin will run the plagiarism process, if the turnitin result is 21% and above the admin will return the reviewed paper to the author, if the result is 20% and below, the admin will create an account for the grammarian. The grammarian will sign into the default account given by the admin. After reviewing the paper, the grammarian needs to update the status of the manuscript so that the author will inform and revised the full paper. The author will revise and submit the final draft of the full paper to the system, author also need to submit the utilization report, so that the admin will proceed to payment endorsement.

INTERFACES

University Research Production and Utilization Management System, consist of four main modules: guest, authors, reviewers and admin. In this section, the details of each of the modules are described.

GUESTS'

This module is made where users of the system have role of guests (any visiting user). These users can navigate through the system and access all the available data on the Web such as registering in the system to become author. When users get registered in the system, henceforth the second module starts, and the users basically become authors.

AUTHORS'

In this module, when authors register on the system, a verification email is sent to their email address to make sure they have used a working email address to activate their accounts. Next, authors will be the owner of a personal and a lightweight control panel framework. The author control panel offers several functions; the most important one is the paper submission process. In this process the authors are able to fill the required fields and upload their manuscript to the system. While the submission process passes positively (guaranteeing all the required information is present), the authors will get a notification email announcing of their successful submission. Authors from their control panel can see all their submitted papers, with the observation of their manuscript status (accepted, rejected, under review, etc.).

As soon as the authors submit their manuscript, the status of the paper changes to in pending; and a notification email is sent to administrator account informing them for a new incoming manuscript that is needed to be assigned for reviewers. Once the submitted manuscript gets assigned to reviewers, the paper status changes from pending to under review. It is significant to remark that the communications between the authors and the reviewers remain completely anonymous (blind peer review); this feature primarily helps reviewers not to be known by authors so that they can fairly evaluate the authors' articles.

REVIEWERS'

The admin personnel will create an account for the reviewers. Similar to authors, reviewers will get their private control panel presenting several functions. The most important one is the papers' dashboard module. In this section, which in turn consists of three main subsections; the reviewers can see all the papers that are assigned to them for review process. The top subsection is for the manuscript that need to be evaluated, while the middle subsection is for the manuscript that need to be technical reviewed, and the bottom subsection is for the manuscript that are resubmitted papers. If the reviewer is a grammarian there is an additional subsection which is the paper for

proofreading. Research Proposal Evaluation form will be enabled if the manuscript is for evaluation and the evaluators are statistician, research coordinator and research director; Research Council Proposal Evaluation form will be enabled if the manuscript is for evaluation and the evaluators are the dean or department head; Research Technical Review form will enabled if the manuscript is full paper and the reviewers are the CORE, statistician, and research director; and Research Proposal Classification will be enabled if the paper is multidisciplinary/collaborative research and if the reviewer is the research director and AVPAR. Administrator will be the one who decide if it is for evaluation, technical review, classification review, and proofread review.

ADMINISTRATORS'

This module is specifically designed for administrator (research personnel) to manage the research production. Administrators have their own control panel but with a wider range of functionalities. The papers' control panel, as from its name, is responsible for manipulating all incoming manuscripts. This panel is divided into six subsections: when a new manuscript is submitted by an author, it appears in the top subsection, which means it needs to be assigned an evaluator. Each manuscript is required to be assigned to the respective evaluator. Admin has the right decision if the research proposal will return to the author or begin the process of technical review. The process of evaluation review (assigning manuscript to evaluators) is very simple. Once the admin creates an account for the assigned evaluator a notification email will be sent out to the evaluators informing them for a manuscript to be reviewed. Afterwards, the manuscript will be moved to the second subsection of the panel which shows the reviewed manuscripts. For each evaluation, admin can check the type of reviewer to know one or all of the reviewers have not evaluated a manuscript, if the status shows under review this mean that the reviewer is not yet submitted the reviewed manuscript, before the day of declared due date of reviewed paper submission a notification will notify that the reviewer need to submit the manuscript. Once the manuscript is being evaluated or reviewed by all of the reviewers, the status will now be visible to the author, admin will be the one who will update the status that the author needs to see.

Users' Site, in a nutshell, this panel is used to handle the registered users in the system. It is segmented into four subclasses: 1) administrator (research personnel), 2) reviewers, 3) authors, and 4) pending users to become reviewers. Admins have absolute privileges to change their roles, and even remove their accounts. It is their responsibility to add a reviewer's account. One of the other functions offered in administrators' module is adding or updating the research production forms.

RESULTS AND DISCUSSION

INTERFACES

Figure 18. Main Page

Figure 18 shows the main page of the university research production and utilization system where the guest sees the call for paper, information about research dissemination, core or technical reviewers, and authors. There is also an about page where the guest can see the information about research office. The register and log in page and also the forms that are available and downloadable that are used for research proposal.

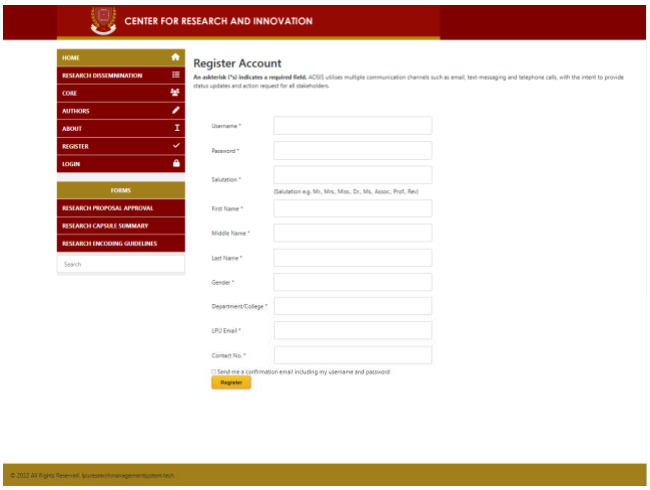

Figure 19. Registration Page

Figure 19 shows the registration page where all the guest needs to create an account to access the authors page.

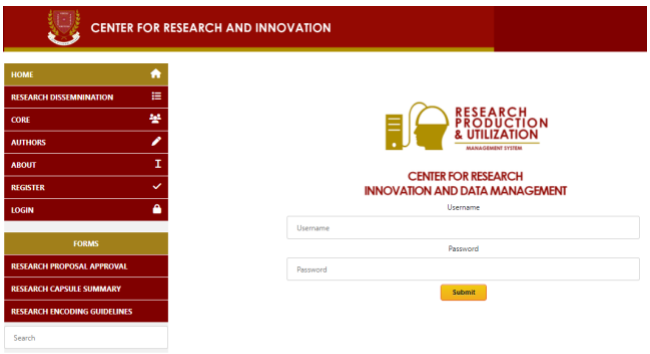

Figure 20. Login Page

Figure 20 shows the login page where all the users can log into their created account.

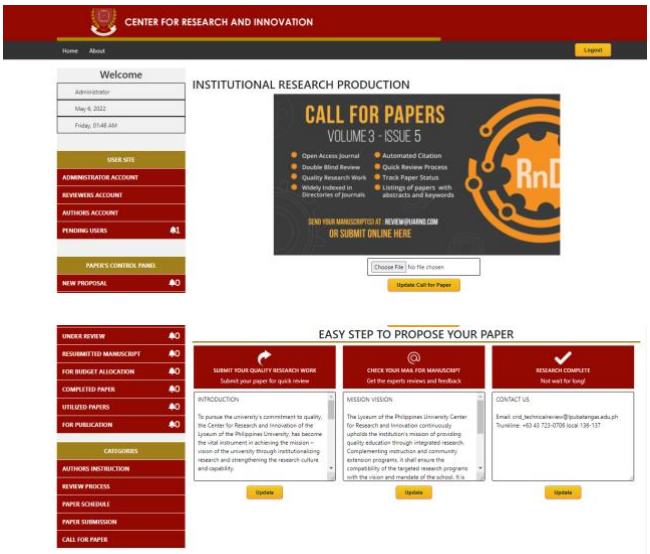

Figure 21. Admin Page

Figure 21 shows the navigation of the administrator which is the research staff where can edit or update all the information like call for paper, information, mission and vision and the contacts of research office. There is also 3 panel in this page which is the user sire where the administrator can see the registered account of the administrator, reviewers, authors, and the pending accounts. The second panel is paper's control panel where the administrator can see all the upcoming proposal, the under reviewed papers, resubmitted manuscripts, the research that is for budget allocation, completed papers, utilized papers and the research that is for publication. Lastly the categories panel where the administrator can update the information that needs to be appeared in the main page of the system.

Figure 22. Author Page

Figure 22 shows the author page, in this page the author can see the call for paper, information about research dissemination, core, authors, and about. My profile page where the author can edit the information, the new submission where the author can submit new proposal, my papers where the author can view the submitted, ongoing, and completed papers. There are also available forms that are downloadable that are needed to propose research.

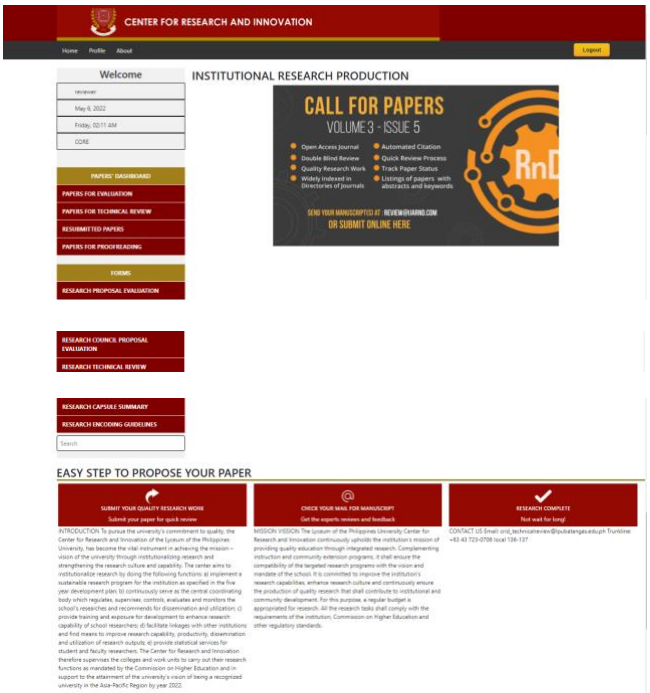

Figure 23. Reviewer Page

Figure 23 shows the reviewers page, there are 2 panels in this page the papers dashboard where the reviewer can view the papers for evaluation, for technical reviews, resubmitted papers, and papers for proofreading. The second panel is forms which are downloadable, this are the forms that are needed to review a paper.

CONCLUSION AND RECOMMENDATION

The University Research Production and Utilization Management System has opened vast number of possibilities in providing better and more flexible solution with regards to submission of research proposals and utilization in comparison to traditional approaches. The University Research Production and Utilization Management System as described in this paper uses a management system approach. The system is adorned with a centralized and seamless console with an array and options for users to maneuver within the system. The system which has been rolled out has benefits in university for researchers, reviewers, and admin personnel. The system has proven to be highly intuitive and seamless among others to withstand the demands of proposals and its related issues. The developer has put together a well-thought-out application which not only automates the manual process but is highly scalable to suit future requirements and other challenges which may arise. It is worth mentioning that the system is not merely automation of manual tasks, but it addressed concerns plaguing most other manual submission mechanism with regards to compliance with process workflow which the authors feel is one of the major hallmarks of the system.

There are provisions for further development. The system for instance could be revised to produce a conference management system. More could be done with regards to the security aspects of the system. For instance, once could introduce a two-pronged authentication mechanism to improve the integrity of submissions. It could be injected with an SMS facility and the ability to embed reminder and alerts.

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