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The Development of A Cloud-Based University Research Repository Software Using A Configurable Subscription Model

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Abstract

With more research that is added every year of every school calendar, there is no doubt it becomes a file or stack of research hardbound resides on the library. These researches should not only settle on the shelves, making them electronically available as references, or to be cited are the ones it truly deserves. This paper emphasizes the need for a cloud-based research repository to be implemented in every University that can be utilized to serve its purpose. This research repository is based on an online publication and subscription model. Online publication provides reading sources via the internet in which is accessible and more convenient to most people. The repository will also adapt the concept of reconfigurability as the users may have their own preferences with regard to how they publish or subscribe to a paper. These would give them more options on deciding how they would publish and or avail paper references. Research that is within the repository that will be referenced, cited, or downloaded has the corresponding remuneration based on the approval of the University. In this way, more researchers will continue to provide more scholarly output to be published and to gain more citing, downloads, and eventually more remuneration. The repository has the potential to expand as more researchers will be turned in its service and would be beneficial to stakeholders. The respondents in this paper show the acceptability of the process, making them more likely to work in any educational institution. Moreover, as time progress, researchers and organizations would avail to use the software in accordance with their needs as well as the preferences of its user with the configurability of the software, thus providing a continuous educational-business process to all stakeholders. And with the current situation of the global pandemic, heterogeneous access to resources is all being sought.

Keywords: *Online Publishing, Subscription Model, Research Repository, Configurability*

INTRODUCTION

Online publication has been a trend in this era as these provide reading sources via the internet in which is accessible and more convenient to most people. This paper aims to elicit the advantages of having an electronic/cloud-based avenue wherein stakeholders can provide their research works while, on the other hand, researchers who are looking for information that will help on their scholarly work. The University will serve as the admin serving as the bridge between stakeholders. Furthermore, this setting enables the distribution of publication globally and delivers content to any devices such as personal computers, tablets, and smartphones. It does not

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also require physical printing and distribution physically which are costly to most companies/organization or individuals who publishes their works. It has also helped and solved the risk of over-production of reading materials (Hughes, 2014).

Online publication has acted as the source of learning for anyone as this enables the publication of a wide range of sources that are written by authors worldwide. Constantly increasing the number of students is relying on these sources as they can view and read in a more convenient manner. The students would no longer need to go to physical libraries, and these would help them access the source anytime and anywhere. This was probably the most exciting development in terms of bringing design thinking into mainstream library practice (Bell, 2016).

It is apparent today that most universities have their own publication sites in which they are able to offer their own written works such as journals and researches. The schools across America are responding with policies in which allow access to open-source textbooks that are written by the faculty, peer-reviewed, and available online. It also enables the improvement of student engagement by being more interactive (Deseret, 2015).

LITERATURE REVIEW

Cloud-Based Technology

According to an article by LoPresti (2014), most publishing companies are now modernizing their business models. One of these movements in the technology sector is shifting into cloud-based computing, where data and information, processing, and storage are managed using the internet or the company's local data servers.

It is said that there are several ways cloud-based services can help publishers. This includes publication, design, content management, and business services. It is a must that publishers are well-informed on the potential benefits as well as the pitfalls in shifting to the cloud. Emblidge (2015) conducted research about building a publishing studies database that can be made available through subscription from an academic publisher and reflected publishing practices globally. An online academic database was created because there are certain problems with textbooks in publishing studies. On the same note brought about by the 21st Century, online publishing has risen in this technological era (McNaught, 2015). It is really evident that approaches to access resources are shifting now using technology. There are signs that this is changing as more libraries cover research outputs emanating from the universities (Bangani, 2018).

Digital Repository and Open Access

A digital repository can serve as a virtual space for gathering and sharing objects of interest and importance, where they can be searched, studied, and enjoyed at any place with access to the internet (Bogucki, 2021).

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The Open Access (O.A.) movement continues to gain traction. The recent breakdown of negotiations between Elsevier and the University of California system has brought renewed attention to O.A. issues to academic faculty, students, librarians, administrators, and governance bodies. The academic library has a role in explaining O.A. issues, advocating for O.A., and of course for supporting and managing O.A. resources, including institutional repositories, O.A. journal subscriptions, OER, open research data, and other O.A. materials such as grey literature. (Mack, 2020).
Open access overall has not allowed libraries to save money on serials **subscriptions** and has often increased costs through their support of institutional **repositories** and payment of author fees. Continued library support for open access is often more of a philosophical stance without significant cost-saving benefits (Holley, 2018).

Subscriptions and Configurability
In 2015, 86 percent of the articles in eLife and PLOS acknowledge funder support, as do 76 percent of the articles in the largely subscription journals of BioOne. Such findings can inform libraries and funding agencies, as well as publishers, in their consideration of a direct-payment open access model (Wilinsky & Rusk, 2019). This shows the increase in subscriptions in journals. The ever-increasing journal subscriptions are also evident in many universities and research institutions failing to provide access to the much-needed scholarship for the propagation of research and development due to dwindling budget allocations (Tapfuma & Hoskins, 2019). Moreover, it provides covering a large number of researches in less time; thus, it is also essential at the same time to understand the **library subscription** quality, according to Bandi,2021.
The price of journals and subscriptions also varies, constantly rising prices of journal and database **subscriptions**, granting agencies requirements for recipients to submit their research publications into open access **repositories**, and pressure on libraries to create Institutional **Repositories** (I.R.) to promote the institutions' reputations (Dawson & Yang, 2016).
Partnership and consortium are also observed to amplify the support in research. John Wiley and Sons Inc., the Austrian Academic **Library** Consortium, and the Austrian Science Fund announced a three-year combined open access publication and **subscription** agreement. This transformative agreement provides researchers and students at 22 institutions with access to all **subscription** journals published by Wiley. Corresponding authors from KEMÖ-affiliated institutions will also be able to publish unlimited open access articles in Wiley's hybrid journals at no charge to the author. (John Wiley and Sons Inc., 2018)
It is apparent that a growing number of people have shifted to using a digital format of publications. People from the academic community use online publication in distributing studies, reports, and journals in a more accessible manner for both students and teachers.

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These online sources are also more inexpensive than the traditional printed format as this no longer requires reprinting copies based on its demand.

Institutions, including universities, have adapted this mainly to make publications more accessible, which helps widen the audience of their published journals or researches. According to Tilley, E. (2004), "Articles freely available online are more highly cited. For greater impact and faster scientific progress, authors and publishers should aim to make research easy to access." In their study, it was concluded that online papers were 4.5 times more likely to be cited than the offline papers. With their conclusion, no doubt that those who aspire to publish their works preferred using digital means rather than the traditional. For such in a university, as the primary subject in this study, digital publishing helps expand the audience of the researches that were submitted in their library, and not only that they could promote these researches, but they could be beneficial for all the researchers who have a hard time finding resources.

The proponent has also adapted the concept of reconfigurability. According to Barreau, Renard & Fournier (2018), it is important for librarians to understand the heterogeneity of these expectations, as well as local priorities, so that journal access meets users' needs.

RESEARCH METHODOLOGY

The research design used in the study is the descriptive method. The descriptive method is primarily concerned with how the variables that were gathered will be turned into a result that will turn out solutions or answers with regards to the problem of the study.

More importantly, the study focused on how a configurable cloud-based research repository may be used within a university. This will be implemented wherein it will allow the faculty, administrative staff, and students to publish their works, particularly researches, where anyone can access and read these papers.

The proponent distributed survey questionnaires to assess the perception of the respondents about what is their ideal research repository. This includes the assessment for the ff. Problems: 1) Their previous experiences on online subscription; 2)The level of agreement of the respondents on the likelihood of supporting the development of a university research repository; 3) The level of agreement of the respondents on the benefits of an online research repository using a subscription business model; 4) The level of agreement of the respondents on the identified characteristics of the system, and 5) The level of agreement on the implementation of a strong security backbone of the system. The proponent measured the level of agreement based on the Likert Scale measure shown in Table 1.

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Table 1. Likert Scale

SCALE	RANGE	INTERPRETATION
1	1.00 – 1.50	Not Problem
2	1.51 – 2.50	Minor Problem
3	2.51 – 3.50	Moderate Problem
4	3.51 – 4.00	Serious Problem
SCALE	RANGE	INTERPRETATION
1	1.00 – 1.50	Strongly Disagree/ Extremely Unlikely
2	1.51 – 2.50	Disagree/Unlikely
3	2.51 – 3.50	Partly Disagree/Neutral
4	3.51 – 4.50	Agree/Likely
5	4.51 – 5.00	Strongly Agree/Extremely Likely

System Development

The proponent has come up with a configurable research repository that established the results of the gathered data from different sources such as the questionnaire, related studies, and related kinds of literature. This is developed through an Agile Development Methodology, which is an iterative and incremental type of development.

The proponent used PHP programming language for the server-side programming and MySQL for the back end of the prototype. The use of a Model-View-Controller framework was also employed in the development, thus the use of the CodeIgniter Framework. The proponent used The Open Group Architectural Framework (TOGAF), which is shown in figure 1, presenting the Enterprise Architecture. It describes the structure and processes of the developed system and how it is linked to other systems within the organization. It is a high-level approach in system designs typically modeled in four levels which are composed of Business, Application, Data, and Technology levels (Wikipedia.org).

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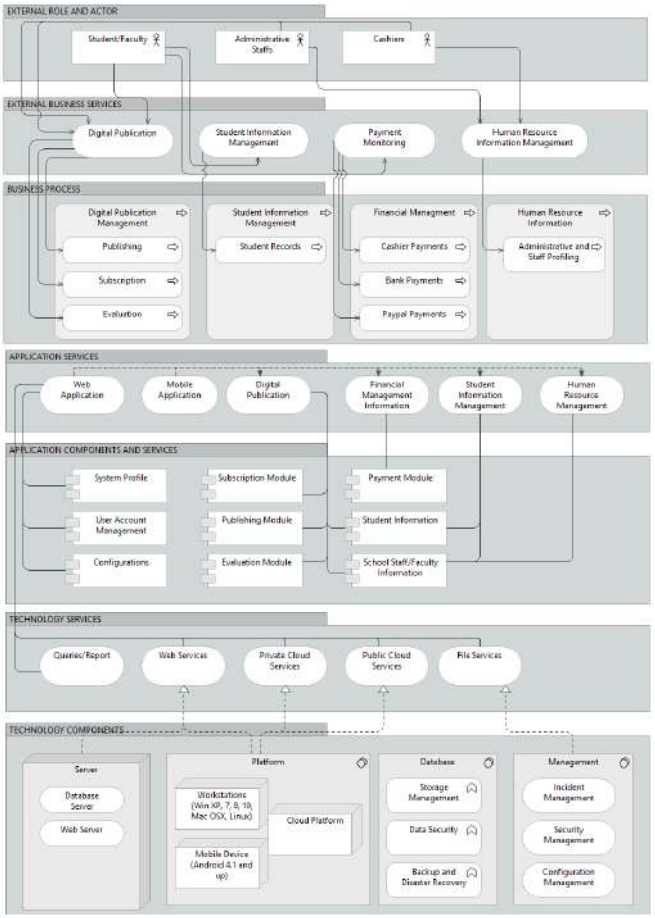

Figure 1. Research Publishing System Enterprise Architecture.

FINDINGS AND DISCUSSION

Based on the analysis and interpretation of the gathered data, the study produced and plotted the following findings:

1. On the assessment of the previous experiences of the respondents on online subscription:
   1.1 The weighted mean of encountering a problem with regards to the cost and payment is *2.44*, interpreted as there were *minor problems* on the previous experience of the respondents.
   This shows that respondents are open to paid subscriptions.
   1.2 The worldwide web (www) presence of the university research repository was considered as a *moderate problem* which obtained an overall mean assessment of *2.63.*
   This shows that respondents preferred to have a research repository that can be accessed through the world wide web.

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1.3 The relevance of material was considered as a *moderated problem* which obtained an overall mean assessment of *2.68.*
This shows that respondents are willing to accept payment subscription as long as the material gathered has relevance to their research or study.

2. On the assessment of the agreement of the respondents on the likelihood of supporting the deployment of the university research repository and its corresponding subscription model, the respondents *likely agreed* on supporting the deployment of a university research repository which obtained an overall assessment of *3.92.*
This shows that most of the respondents would like to have a research repository.
3. On the assessment on the level of agreement of the respondents on the benefits of an online research repository using a subscription business model:
   3.1 The respondents *agreed* on the benefits of an online research repository using a subscription model when it comes to the predictable revenue of the school, obtaining an overall mean assessment of *4.10*.
   3.2 The respondents *agreed* on the benefits of an online research repository using a subscription business model in terms of building longer-term relationships, obtaining an overall mean assessment of *4.08*.
   3.3 The respondents *agreed* on the benefits of an online research repository using a subscription business model in terms of convenience for students/researchers, obtaining an overall mean assessment of *4.10*.
   3.4 The respondents *agreed* on the benefits of an online research repository using a subscription business model in terms of minimizing workload, obtaining an overall mean assessment of *4.10*

   This further supports the advantage of having a research repository that could work both for the researcher and students. The repository could also be an added tool for income generation options for the University.
4. Figure 2 shows the business process flow of the system. As seen, publishers, either a student or a faculty member, may submit research. It will be evaluated by an evaluator and may decide to approve or reject to publish the research. If approved, the school administrator will set the price for the research. After setting the price, the research will be published.

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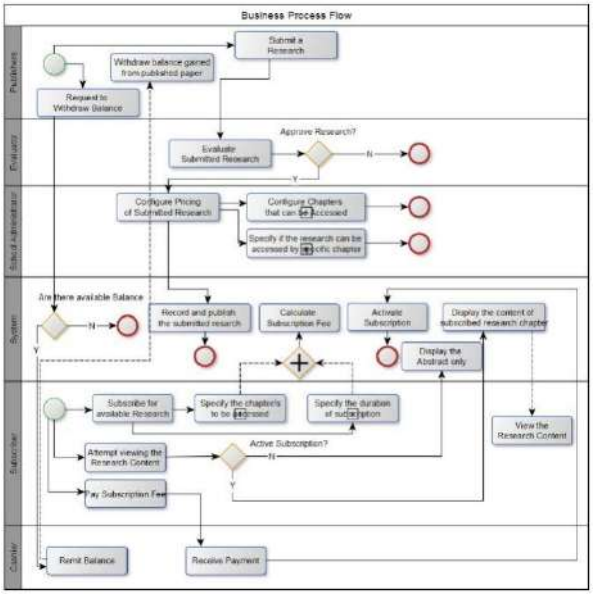

Figure 2. Business Process Flow of the Research Publishing System

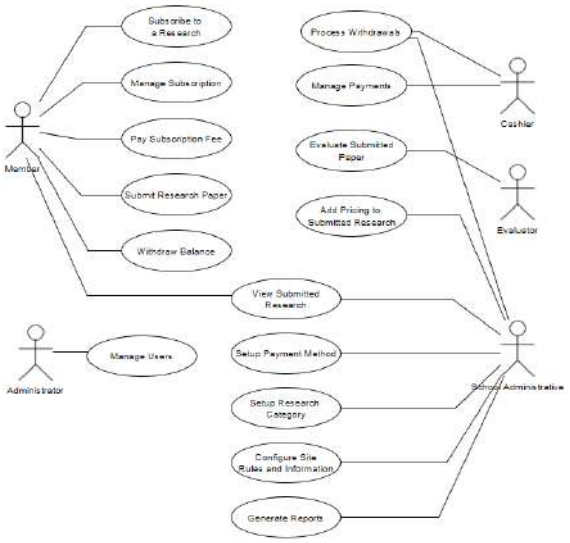

Figure 3. Use-case of the Developed Research Publishing system

Figure 3 shows the use-case overview of the developed system. There are five (5) roles in the developed system. Each of these roles has varied access to the different features of the system.

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5. Assessment of the level of agreement of the respondents on the identified characteristics of the system:
   5.1 The respondents *agreed* on the effectiveness of the identified characteristics of the system in terms of features and functionality, obtaining an overall mean assessment of *4.17.*
   5.2 The respondents *agreed* on the effectiveness of the identified characteristics of the system in terms of navigation, obtaining an overall mean assessment of *4.23.*
   5.3 The respondents *agreed* on the effectiveness of the identified characteristics of the system in terms of control and feedback, obtaining an overall mean assessment of *4.28.*
   5.4 The respondents *agreed* on the effectiveness of the identified characteristics of the system in terms of context and text, obtaining an overall mean assessment of *4.25.*
6. On the assessment of the level of agreement on the implementation of a strong security backbone of the system.
   6.1 The respondents *agreed* on the implementation of a strong security backbone of the system in terms of attack monitoring and prevention, obtaining an overall mean assessment of *4.23.*
   6.2 The respondents *agreed* on the implementation of a strong security backbone of the system in terms of a strong password, obtaining an overall mean assessment of *4.14.*
   6.3 The respondents *agreed* on the implementation of a strong security backbone of the system in terms of two-factor authentication (2FA) on all the accounts, obtaining an overall mean assessment of *4.12.*
   6.4 The respondents *agreed* on the implementation of a strong security backbone of the system in terms of embedding other measures in the system both in application and process, obtaining an overall mean assessment of *4.18.*

CONCLUSION

With the current trend of technology, especially with the way research is going on, it is essential to have an online repository of researches. This will ensure that every research created can be monitored, referenced, viewed, and even cited. Moreover, this study shows that online subscription is just a moderate problem showing that subscribing is more accepted than in traditional library setup. Respondents likewise agreed that the online research repository is beneficial in terms of the predictable revenue of the school, building a long-term relationship, convenience, and minimizing workload. All stakeholders will benefit from these settings, from the creator of research, from the individual who is looking for a reference for research, for the school in maintaining and monitoring research—creating a single avenue where all stakeholders interact, thus providing a strong output on research.

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RECOMMENDATIONS

The repository and subscription model resolves the problems of availability of researches. With the current situation of the global pandemic, the system will converge all the stakeholders into a single avenue to address their needs. Universities and academic libraries are encouraged to utilize the system to cope and augment sharing of academic resources of research, thus minimizing the workload of the management in handling researches. When it comes to payment options for subscription it is recommended to use different payments APIs, such as payments REST API by PayPal, thus recommended to be integrated with the system. This will enable payments to be done online and may be able to attract more interested subscribers who do not have time to go to actual school or bank.

When it comes to security, it is recommended to use at least Two-Factor Authentication in retrieving passwords or accounts. This is to firmly avoid common system vulnerability, such as identity theft. Future researchers that are also conducting the related study may use this as a reference and guide for further studies in improving the related system.

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