

Systematic Review of Open Education Resources Repository: A Gateway for Scholarly Communication in Developing Countries

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Abstract

Development in information technology has universally led to an increase of the importance of the Open Education Resources Repository. This has been of great help in achieving the sustainable development goals on the promotion of quality education and supporting innovation in the community. The technology of open education resources repository has been prominent since 2010 and comprehensively adopted in developed countries. However, it has been dynamically improving in developing regions though its performance fairly convinces appreciations on the invested initiatives. This paper establishes the need to examine the users' awareness of the repository, performance and influencing factors on the performance of open education resources repositories in developing countries. A systematic review of literature was employed in which 25 research papers were investigated. The papers were searched from four aggregate tools, namely Google Scholar, ResearchGate, OpenPraxis and Refseek. The Excel computer application software was used to analyse quantitative data whereas qualitative data were subjected to content analysis. Among other things, higher learning institution open education resource repositories in developing countries are becoming common among the academic community. Their performance is significantly remarked in erratic context between regions and diagnostically hampered by varying factors, including technological and infrastructural aspects, financial disputes, environmental and institutional issues. On this, the institutional management support committed to creating open access resources. These resulted to minimal satisfaction on the contribution of the repositories among the scholars. Such open education resources repository guidelines including policy, procedures and standards impacted the repositories performance. The paper encourages on the need for improving information resources acquisition, efforts on raising awareness, dissemination, advocacy, marketing, management and user support services. However, open education resources

repository policy needs to be improvised for quality control and procedures for backup to enhance security, intrusion and mitigation of the effects of potential disasters and fostering sustainability of the open education resources repository.

Keywords: Open access repository, open education, open access policy, distance learning, systematic review, scholarly communication, developing countries

Introduction

Development in information and communication technology has universally led to an increase in importance of the Open Education Resources Repository (OERR) in achieving the Sustainable Development Goals (SDGs4) on the promotion of quality education and supporting innovation in society (Mwalubanda, 2021). The OERR is a new phenomenon that uses internet to provide a gateway for scholarly communication in higher learning institutions (Miracle, 2020). The introduction of the OERR in higher educational system is significant and potential for improving quality and efficiency in teaching and learning; it minimizes costs and removes geographical barriers to the scholarly communication (Pounds & Bostock, 2019; Miracle, 2020). In light of this, scholarly communication has been a panacea to networking through collaboration, exchange, sharing and support among scholars that have common interest (Garcia-Vera *et al.*, 2015). In the context of digital dynamics, scholarly communication focuses on sharing insights, strategies and information resources in multimedia approaches across the globe among higher learning institutions, organisations, public and private sectors and ultimately increases efficiency and impacts education (Koutsileou *et al.*, 2019). The OERRs are electronically developed to provide free access to information resources on a public domain and are protected by copyright and licensed under Creative Common (CC) (Mwinyimbegu, 2018). The open education resources support teaching and learning and are obviously accessed through the higher learning institutions portals. The emergence of open education resources has contributed to developing interest among higher learning institutions over the universe. As a result, they have rendered global scholarly communication as they offer not only access but re-usability in various formats (Miracle, 2020). The OERs include but not limited to audios, texts, videos, animations and graphic resources; they provide legal rights to any scholar to copy, use, share and re-share (Mwinyimbegu, 2018). Librarians in higher learning institutions have a role of managing the OERs

and have to be engaged in providing scholarly resources at free and expertise on the OER through the OERR.

Background to open education resources repository

Globally, initiatives for the OERR begun in the United States of America (USA) in 2001 by the Massachusetts Institute of Technology (MIT). The institute managed to make all the courses, teaching and learning resources freely accessed online by any scholar over the universe (Zaid & Alabi, 2020). All the resources are made open to various scholars based on curriculum and its access is controlled by open access license. The resources were put and available on Open Courseware (OCW)¹ platform. Subsequently, in 2008, advanced initiatives on the OERR resulted to a global OCW Consortium (OCWC) which incorporated more than 260 higher learning institutions and affiliated organisations from more than 30 nations across the globe (Lesko, 2013). From this effect, massive movements and proliferation of the OERR became paramount, a significant mechanism and considered as a digital framework of the modern higher learning institutions. The framework provides for digital preservation, management, maintenance and dissemination of education resources among the scholars and a given community (Garcia-Vera *et al.*, 2015). On one hand, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) joined efforts with the MIT in 2002 in making this endeavour evenly established over the universe (Belikov & Kimmons, 2019). In general, OCW is a high quality multimedia and digital educational resources publication that provides freely and openly licensed service that offers online scholarly communication to anybody over 24/7/365 without geographical location and cost barriers. A Massive Open Online Course (MOOC) Model is a good example of the OCW (Wordu & Nwaizugbu, 2021). The introduction of the OERR enabled the integration of the modern ICT in meeting the right of access to information among the scholars and the community at large. It ultimately became the dominant right in the information and knowledge age. In this regard, scholars are potentially involved in the global information based on socio-economic and political activities (Ivwithreghweta, 2012).

The growth of the OERR has been very remarkable in the northern as well as in some of the southern globe. Since 2010, there has been the OERR growth in

¹Massachusetts Institute of Technology (MIT) OCW - <https://ocw.mit.edu/>

South regions of the United States of America, Eastern Europe especially in Poland, East Asia, Germany, Austria and United Kingdom (UK); after which Japan and some African countries followed (Orsu, 2019; Adam & Kaur, 2022). During the period, some countries including France, Italy and Spain have maintained steady growth on the OERR whereas other countries particularly China, Russia and most of the African countries have experienced limited growth (Stagg *et al.*, 2018). In the UK there have been initiatives of higher learning institution OERR collaboration through the Scottish open education declaration (Gyasi, Corleley & Frempong, 2010). The government of the UK collaborated with the Joint Information System Company (JISC) which provides network and information technology services and digital resources. The joint efforts assisted in managing 65 OERR projects of the UK higher learning institutions between 2009 and 2012 (Stagg *et al.*, 2018). Furthermore, the Chinese Ministry of Education gathered traction to the OERR and established the open source platform – Xuetang Online in 2015 that shared over 20,000 open courses and the resources accessed under Chinese license. However, awareness levels among scholars and Chinese higher learning institution communities remained low to seize this opportunity and the foregone investment (Stagg *et al.*, 2018).

In Africa, the establishment of the OERR and use of the OCW has been founded by various entities, including the African Virtual University (AVU) under Multinational Project 1 in 1997. Through this project, 12 African higher learning institutions from 10 African countries were collaboratively engaged in establishing the OERR. In light of this, 219 modules in various courses were made freely available online to the respective institutions through the AVU's platform. Report indicates that from December 2010 to August 2011 more than 300,000 scholars from different locations including the USA, France, Brazil and Portugal accessed the AVU portal in mainly three languages of English (50%), French (30%) and Portuguese (15%) (Lesko, 2013; Stagg *et al.*, 2018). On the one hand, further initiatives have been contributed by Teachers Education in Sub-Saharan Africa (TESSA) and the OER Africa². The OER Africa in collaboration with the respective African higher learning institutions, for the first time in 2019 joined efforts with the University of Michigan to establish a project for the health OERR to a number of higher learning institutions in Africa (Lesko, 2013). In

² OER Africa - <https://www.oerafrica.org/oer-initiatives-africa>

Tanzania, the Open University of Tanzania (OUT) was the first higher learning institution in East Africa to establish the OER. The university mainly offers distance education and thus much of its collaboration with the university students and the community is conducted through the OER (Samzugui & Mwinyimbegu, 2013; Nunda & Elia, 2019).

Despite the multilingual characteristics of the OER, the copyright and license issues on the educational resources, still the higher learning institutions have a role to strike the balance to provide effective scholarly communication. The resources in the repository have to be contented with the main 5Rs rights which are: retainment which provides scholars with a right to make and manage content, reusing the OER content widely and by any means, revise through modification of the OER content in various format and language, remixing which provides the right to create new content from different OER contents and redistribution that the scholars have a right to share and disseminate the OER content on the original format, in a revised and or remixed format (Peneder & Walcher, 2020). In respect to these rights, the institution and its community are aware of the OERR; thus, they increase its visibility, improve quality of the OER content and scholarly communication across the universe and ultimately impact on economic development (Narayan & Luca, 2017). However, the widespread implementation of the OERR across the developing countries is significantly earmarked though it is not extremely spreading because of various hurdles related to institutions strategies, external and internal environmental issues (Dlamini & Snyman, 2017; Oguche, 2018). Based on this ground, this paper specifically intended to systematically review the literature on the awareness of the OERR and factors influencing the performance of the OERR in scholarly communication in developing countries toward its prominence to the open education resources access from 2010 to 2022. This paper, therefore, intended to answer the following questions:

- i. To what extent are the developing countries aware of the OERR for scholarly communication?
- ii. What is the level of performance of the OERR in scholarly communication in the developing countries?
- iii. What are the factors influencing performance of OERR in scholarly communication in the developing countries?

Methodology

A systematic literature review based on Search, Appraisal, Synthesis and Analysis (SALSA) Framework and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria were used to study the phenomenon underpinning the study. The SALSA approach provided the reviewers an ability to minimise the factors of subjectivity. It is pointed as one of the most appropriate measures which identify, evaluate and systematise literature (Amo *et al.*, 2018) and guarantee precision and completeness of the methodology used in the systematic review (Grant & Booth, 2009). In addition to this, the PRISMA statement ensures accuracy and completeness of the study at hand (Moher *et al.*, 2009). The PRISMA statement provided a preliminary and evidence based list of organised information for establishing a comprehensive and combined report of meta-analysis and the systematic review (Sam *et al.*, 2020). In light of this, a systematic review is obviously an audit of a deliberate inquiry that consumes precisely and unambiguously the strategies to measure and scan data from the collected search studies that comprises the review (Sam *et al.*, 2020). The SALSA framework subsequently led the reviewers to the PRISMA criteria. Table 1 presents the framework for the systematic literature search and review in this study.

Table 1: SALSA Framework for Systematic Literature Search and Review

Stage	Description	
Search	Key actions:	Keywords identification; search data sources
	Study scope:	Limited to studies related to the OERR in developing countries. The limitation on the selected studies provide major insights in order to appraise and synthesise the phenomenon underpinning the study
Appraisal	Key actions:	Studies selection through the PRISMA approach
Synthesis	Key actions:	Data extraction and categorical organisation
Analysis	Key actions:	Data analysis, findings comparison and conclusions

Source: (Amo *et al.*, 2018)

A systematic literature search was conducted to four aggregate data sources which included: Google Scholar, ResearchGate, Refseek and OpenPraxis as well as backward citation track which provided other search results on the study. A combination of search key terms was employed to obtain the data sources from 2010 to 2022. These subject search terms were: “Open education resources” + “scholarly communication” + “Developing Countries” and “Open education repository” + “Developing countries”. The search resulted to an attainment of 105 articles. The articles were evaluated and the PRISMA statement

recommendations for the selection of the articles were followed. The criteria for inclusion of the articles involved the article's keywords being in the title, as well as the abstract and the article published by the scientific and peer reviewed publisher. The exclusion criteria of the search results were on papers from the conference proceedings, editorial letters, non-English articles and articles which were not primarily research based. In this, six (6) non-based research papers, six (6) non-English articles and others as shown in Figure 1 were excluded from the content analysis of the 105 articles, 21 articles were combined for inclusion in the study as they met the inclusion criteria. A snowball method was used for backward citation track for other articles which were not found during the search. Four (4) additional articles were obtained and ultimately ended with 25 articles that were relevant to the OERR for scholarly communication in developing countries. Content analysis was applied for the 25 articles obtained from the search. This is an indicator that either the use of the OERR for scholarly communication in the developing countries is not an area where researchers want to investigate or the area of study is not familiar in many parts of the developing countries. Lee *et al.* (2021) explain that content analysis is a highly applicable and flexible research approach applied in library and information field with varying research themes and objectives. It is a fairly focused method to perform; it can be done conveniently and with less attention on ethical issues. Figure 1 presents a flow of information for the search results which are relevant to this study.

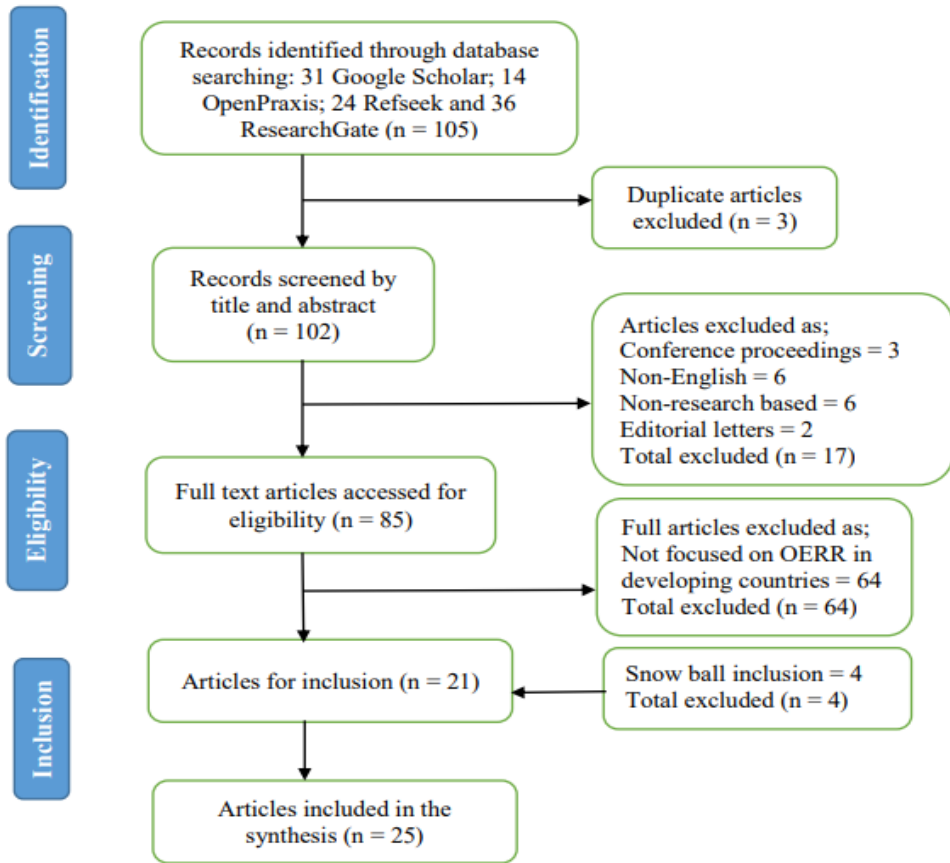


Figure 1: Flow of Searched Information (PRISMA Statement)

The articles included for further analysis were extracted and categorised based on the study objectives. The next section provides the detailed analysis of the included articles.

Analysis Process

The analysis of the articles included in the study was based on research questions. Content and Microsoft Excel computer application software was used to achieve the analysis. The selected articles were coded to simplify the review process and subject to research questions. Descriptive statistics in the form of tables, pie charts and graphs were used to present the review analysis. As indicated in Table 2, the spreadsheet provided the valuable and appropriate information about each article, such as the author, the title and the database where the articles were retrieved together with the year of publication.

Table 2: List of articles included in the systematic review (n=25)

Code	Author	Title	Database	Year
OER1	Mwinyimbegu, C. M.	The role of libraries and librarians in open educational resources in Tanzania: The case of selected public university libraries	Google Scholar	2018
OER2	Miracle, N.	An assessment of open educational resources by students in selected academic institutions in Southwest, Nigeria	Google Scholar	2020
OER3	Munaja, P.S. & Ndenje-Sichalwe, E.	Institutional repository initiatives in Tanzania: Opportunities and challenges	Google Scholar	2016
OER4	Nwokedi, V. C. & Nwokedi, G. I.	Open access institutional repositories in academic and research institutions in Nigeria: A review of benefits and challenges	Google Scholar	2018
OER5	Nyambi, E. & Maynard, S.	An investigation of institutional repositories in state universities in Zimbabwe	Google Scholar	2012
OER6	Peneder, M. & Walcher, F.	Open education resources: Current limitations and challenges and its usage in developing countries	Google Scholar	2020
OER7	Samzugui, A.S. & Mwinyimbegu, C.M.	Accessibility of open educational resources for distance education learners: The case of the open university of Tanzania	Refseek	2013
OER8	Kassahun, K. & Nsala, C.	The awareness of academic librarians towards open access resources to support reference services: A case of private institutions of higher learning in Gaborone, Botswana	Refseek	2017
OER9	Kuri, R. & Singh, M.	Indian Institutional Repositories (IRs) reflected in the Directory of Open Access Repository (DOAR): A case study	Refseek	2020
OER10	Mtebe, J. & Raisamo, R.	Investigating perceived barriers to the use of open educational resources in higher education in Tanzania	Refseek	2014

OER11	Upneja, S.K.	Contribution of library professionals and libraries in open educational resources in Indian scenario	Refseek	2020
OER12	Enakrire, R.T. & Ngoaketsi, J. M.	Open access practices: Roadmap to research paper publications in academic institutions	ResearchGate	2020
OER13	Ezema, I.J. & Okafor, V.N.	Open access institutional repositories in Nigeria academic libraries: Advocacy and issues in scholarly communication	ResearchGate	2015
OER14	Igwe, K.N.	Open access repositories in academic and research institutions for the realisation of Nigeria's vision 20: 2020	ResearchGate	2014
OER15	Ofoegbu, O.T., Asogwa, U.D. & Ogbonna, C.S.	Open Educational Resources (OERs) and courseware development in dual-mode universities in Nigeria	ResearchGate	2021
OER16	Cox, G., & Trotter, H.	Factors shaping lecturers' adoption of OER at three South African universities	OpenPraxis	2017
OER17	Flor, A.G.	Exploring the downside of open knowledge resources: The case of indigenous knowledge systems and practices in the Philippines	OpenPraxis	2013
OER18	Gandhe, S.K.	Quality assurance in open and distance learning in India	OpenPraxis	2010
OER19	Loglo, F. & Zawacki-Richter, O.	Exploring OER awareness and engagement of academics from a global south perspective - a Case Study from Ghana	OpenPraxis	2019
OER20	Lesko, I.	The use and production of OER & OCW in teaching in South African higher education institutions: Case Study	OpenPraxis	2013
OER21	Jayatilleke, B.G., & Kulasekera, G.U.	Forty years of distance education: Challenges and implications at the Open University of Sri-Lanka	OpenPraxis	2020
OER22	Hodgkinson-Williams, C.	Benefits and challenges of OER for higher education institutions	OpenPraxis	2010

OER23	Tlili, A., Altinay, F., Huang, R. <i>et al.</i>	Are we there yet? A systematic literature review of open educational resources in Africa: A combined content and bibliometric analysis	OpenPraxis	2022
OER24	Pete, J., Mulder, F., Neto, J.D. & Omollo, K.L.	Differentiation in access to and the use and sharing of (open) educational resources among students and lecturers at technical and comprehensive Ghanaian universities	OpenPraxis	2018
OER25	Padhi, N.	Acceptance and usability of OER in Indian higher education: An investigation using UTAUT Model	OpenPraxis	2018

Source: Authors' Construction (2022)

Table 2 indicates that majority of the publications on the OERR for scholarly communication in developing countries were published in the year 2020 equals to six (6) articles while in 2018 and 2013 four (4) and three (3) articles published respectively. In addition, two (2) articles each were published in 2010, 2014 and 2017 whereas one (1) article each was published in 2012, 2015, 2016, 2019, 2021 and 2022 but none for 2011. This is generally to say that from 2010 to 2022 there were publications in the area and this is quite impressive based on the fact that the OERR has been crucial in scholarly communication in developing countries. It is alarming to find that none of the publications were published in 2011. But this is not the scope of this study to analyse the reasons as to why no publications are observed in this time. However, a significant number of publications were in the year 2020 which imply that the OERR became a prominent innovation in most developing countries during the year 2020. Figure 2 presents the graphical distribution of the OERR publications from 2010 to 2022.

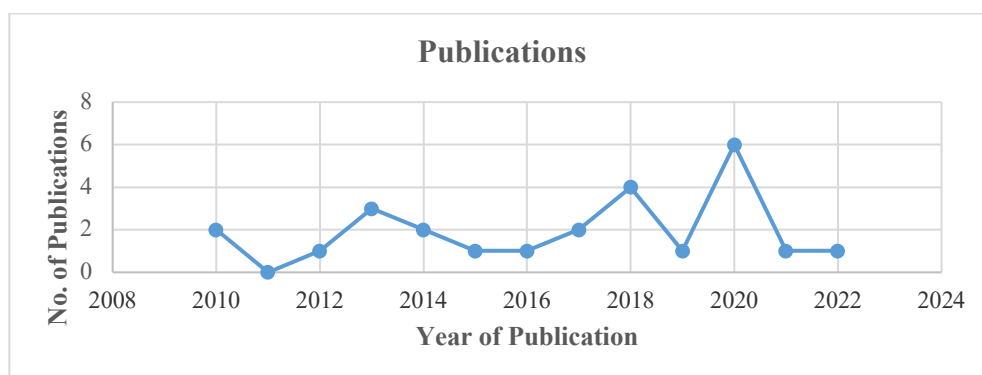


Figure 2: Publications in Different Years from 2010 to 2022 (Authors' Computation, 2022)

In terms of the aggregate data sources, OpenPraxis had 11 included articles while six (6) articles were from Google Scholar; five (5) included articles were from Refseek and only four (4) articles were from the ResearchGate aggregate tool. In this regard, OpenPraxis was the most prominent aggregate tool for resources in respect to the OERR for scholarly communication in developing countries. This might be contributed by its prominence and being based on housing knowledge related to research and innovation in open, distance and flexible education. The distribution of articles included for the synthesis of this study is presented in Figure 3.

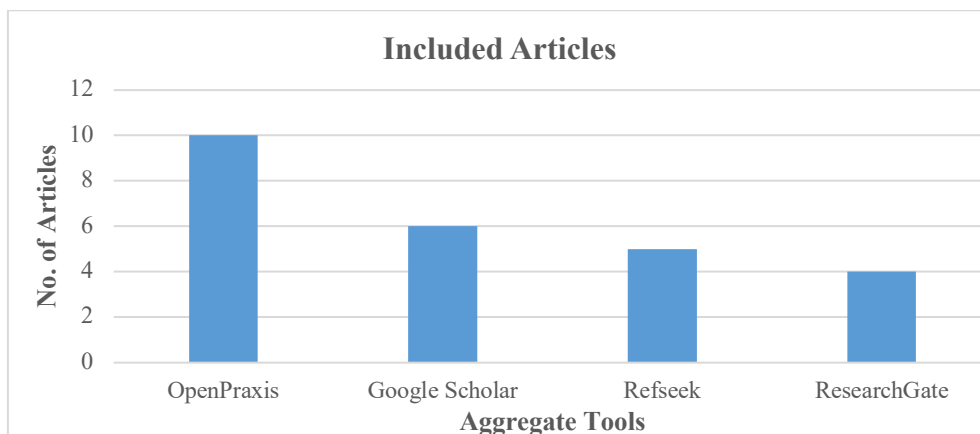


Figure 3: Aggregate Tools with their Included Articles (2010 to 2022), (Authors' Computation, 2022)

Results and Discussion

This section covers the results and discussion of the systematic review based on the research questions that were developed to review the essence of the OERR in scholarly communication in the developing countries.

Awareness to open education resources repository in developing countries

The northern globe has been in use of the OERR for scholarly communication for over a decade today. Given the benefits of this innovation in higher learning institutions has developed interest and motivated the southern globe to become aware of the OERR for institution visibility, reaching the mass through scholarly dissemination of information and at a cost-effective means (Belikov & Kimmons, 2019). Among others, awareness to the OERR in India higher learning institutions was remarked in 2002 where through the Bangalore Declaration of 2006 on open access movement, an OERR policy for developing countries was established (Biswas & Roy, 2013). In this, the Indian Institute of Science in Bangalore was the first to establish the OERR in 2004. It was from this lens that, the institute conducted training workshops and various professional and expertise assistance to the rest of the institutions in India that aimed to raise awareness and capacity building on the OERR for scholarly communication (Kuri & Singh, 2020). Furthermore, Mwinyimbegu (2018) insists on the fact that, awareness to the OERR in higher learning institutions of the developing countries is paramount and for it to be effective it has to be integrated with the library collection platform. In light of this view, training workshops and capacity building programmes shall focus on the librarians. Awareness on the OERR to librarians

is potential as they are the people involved in describing resources, managing open access resources, sharing and dissemination of digital content, digital literacy training, managing intellectual property rights, subject based guiding and promoting appropriate open licensing (Mwinyimbegu, 2018).

In Philippines, awareness on the OERR among institutions was potentially put forward by various efforts of the government and the funding agencies such as the International Development Research Centre (IDRC). The centre funded higher learning institutions in Philippines to raise awareness among librarians between December 2008 and July 2009 on the OERR for scholarly communication (Flor, 2013). The African higher learning institutions became aware of the OERR following the contribution of the OER Africa, TESSA and African Virtual University (AVU) (Pounds & Bostock, 2019). For instance, the Nigerian higher learning institutions became aware of the OERR in 2009 through the collaborative efforts with the OER Africa (Oguche, 2018). Despite the African efforts on raising awareness to the OERR, Ghana has remained an active member in a number of consortia and projects involved with open, distance and e-learning initiatives and thus higher learning institutions have a significant experienced on the OERR. In this, Ghana is a member state of AVU and has improved its distance learning through two open university colleges of Laweh and West Africa established in 2014 where much of the scholarly communication is conducted about the OERR (Pete *et al.*, 2018).

Zagdragchaa and Trotter (2017) opine that the Mongolian higher learning institutions have been aware of the application of the OERR for scholarly communication ever since 2010. Considering the importance of the OERR, the Mongolia Government in 2014 conducted a series of national forums, training workshops and projects for open education resources awareness and adoption. Different international advocacy groups assisted in building a critical mass support for the OERR and ultimately established a Creative Commons Mongolia licensing for open access to the education resources.

Generally, awareness to the OERR among the academic community, on the one hand, improves interactions with the platform. On the other hand, it assists in identifying the strengths and weaknesses of the platform through recommendations and suggestions from the users. The results indicate that countries such as Nigeria, India, Tanzania, Philippines, Mongolia and Ghana have considered awareness services to the OERR to be crucial for improving scholarly

communication and its sustainability. Awareness to a given technology or invention is a kind of return to the invested resources. In light of this view, researchers from these countries have developed interest of researching on the ways this technology influences the performance of the OERR in scholarly communication. Moreover, awareness to this technology contributes toward the visibility, technology absorption and currency, transparency, time and other resources management, reaching the mass through open access, satisfaction and effective performance of the higher learning institutions in developing countries.

Performance of OERR in developing countries

The OERR technology has transformed the processes of teaching and learning in developing countries. The countries that have considered the OERR important have tremendously and remained sustainable in this endeavour. In the Central Asia, the higher learning institutions in Mongolia and Kyrgyz Republic have ever since 2014 adopted the OERR technology and advanced to as many partners across the educational institutions. Efforts have been in place to ensure that training programmes are conducted for expertise and use among the academic community. Various projects are performed at the institutional level for improvement and management of the OERR. In this, the focus of the projects was to establish digital platforms for the OER, enhance awareness campaigns, establish discussion forums for the performance of the OERR and grant issues to support sustainability of the OERR (Walz & Bekbalaeva, 2018). However, Padhi (2018) and Pounds and Bostock (2019) opine that in Asia, the Indian higher learning institutions were the earlier adopters of the OERR technology in 2002. Nevertheless, they have been facing some challenges including the OERR click rates, little studies being conducted in regard to the OERR technology and thus influenced the management of the platform and hence the expected sustainability. Furthermore, the Open University of Sri Lanka (OUSL) adopted the OERR in 1980 and progressively advanced in harnessing the emerging trends for improving distance education through open access approaches. The OUSL has become the famous institution in Sri Lanka for open and distance learning services and much of the programmes offered are conducted online (Jayatilleke & Kulasekera, 2020).

On a different note, the African continent despite the initiatives of a number of organisations and higher learning institutions collaboration for improving the performance of the OERR, the implementation and performance levels varies significantly among its countries. In making the OERR sustainable, some of the higher learning institutions such as the Africa Nazarene University in Kenya,

Botswana Open University in Botswana, Kwame Nkrumah University of Science and Technology in Ghana, the National Open University of Nigeria, the University of Cape Town in South Africa and the University of South Africa established the respective national policy for guiding the performance of the OERR. The policy states the OERR management principles and support the use, creation and scholarly dissemination of the open education resources under open license (Raju *et al.*, 2015; Tlili *et al.*, 2022). For instance, in South Africa higher learning institutions' librarians and instructors have been playing role at ensuring that the use of the OERR is insisted among the students and that what is uploaded for scholarly communication must comply with the quality standards to provide for accuracy, completeness and rigor (Cox & Trotter, 2017). In Ghana, higher learning institutions use the 5R principles of retain, reuse, revise, remix and redistribute for improving performance of the OERR. The academic community was well informed and thus made aware of the technology which ultimately improved capability to use the platforms for scholarly communication and content redistribution. Practices on educational resources recovery, acquisition, revise and remix complemented the performance of the OERR (Loglo & Zawacki-Richter, 2019).

Miracle (2020) observed that the Nigerian higher learning institutions adopted the OERR technology and progressed in using it to date. Librarians and instructors are involved in developing guides for the academic community and particularly students on how best they can interact with the platform. Similarly, in Tanzania, Samzugü and Mwinymbegu (2013) point out that, the Open University of Tanzania (OUT) being the famous institution in offering open distance education has enormously used the OERR and performed progressively for scholarly communication to meeting the academic community needs and satisfaction despite the users' location and time for access. Among others, the OUT has invested much on promoting the OERR through the institution's website and collaborative efforts with the African Virtual University courseware which supports in strengthening the quality of resources and expertise. Similarly, the MIT courseware collaborates through provision of multimedia information resources to the OUT OERR for improving distance learning and networking. Another collaborative OER initiative with the OUT is the TESSA that provides a broad spectrum of the OER to support scholarly communication and the performance of the OERR.

In totality, the performance of any innovation has to be determined by various factors. The factors include but not limited to provision of declarative knowledge to the community, imparting informative procedures on how to use the technology at place, motivating users and expertise on using, monitoring and evaluating the platform, investing on the innovation for efficient maintenance, repairing and sustaining, building strong relationship with users and creators of the OER and advancing self-leadership ability on the innovation. Findings from the systematic review of literature indicate that higher learning institutions in the developing countries are putting significant efforts in improving the performance and sustainability of the OERR. The institutions offering open distance education such as the OUSL and OUT in Sri Lanka and Tanzania respectively are struggling in making this endeavor sustainable. The approaches deployed by these institutions have to be adopted by other universities for proliferation, performance and remaining relevant on open access initiatives.

Factors influencing the performance of OERR in developing countries

The performance of the OERR in developing countries' higher learning institutions is not sufficiently promising in comparison with their counterparts. Common internal and external factors related to economic, environment, technology, infrastructures, political, policy issues, social, language, digital literacy and the institutions' perception have contributed towards the proliferation of the OERR (Mwinyimbegu, 2018; Peneder & Walcher, 2020). For instance, in Sri Lanka higher learning institutions are facing issues related to institutional management commitment, inventions for sustainable development of the OERR, visionary leaders, issues of infrastructures and resources (Jayatilleke & Kulasekera, 2020). On the one hand, Pounds and Bostock (2019) and Upneja (2020) concurred that the performance of the OERR in Indian higher learning institutions has been influenced by reluctance of the institutions' management in addressing the barriers pertaining to sustainability of the OERR. Other factors are technical know-how, awareness to the OERR, availability of information technology facilities, the OERR policy, institutional management support and interest towards the OERR inventions.

In Africa, despite the remarkable initiatives of investing in the OERR, the continent's higher learning institutions have always been influenced by funding aspects, policy issues, management of the OERR, acquisition of current open educational resources, infrastructures, training and re-training programmes on the OERR. Similarly, internet connectivity and high management costs have been

earmarked to influence the performance of the OERR in various African higher learning institutions including among others, Kenya, Tanzania, South Africa and Uganda (Enakrire & Ngoaketsi, 2020; Peneder & Walcher, 2020). Furthermore, Tlili *et al.* (2022) categorised the factors influencing the performance of the OERR in African higher learning institutions into six categories of the OERR policy and copy right issues, infrastructures, financial issues, pedagogies, personal aspects and language barriers. These categories were similarly observed by other scholars in South Africa and particularly at the University of Cape Town (Hodgkinson-Williams, 2010; Lesko, 2013).

Ofoegbu *et al.* (2021) identified, among others, that factors related to technology, socio-economic issues, relevance of the OERR, higher learning institutions and national aspects influenced the sub-Saharan African institutions in performing and sustaining the OERR. These findings corroborate with the earlier ones on barriers of the OERR's performance in sub-Saharan African higher learning institutions observed by Peneder and Walcher (2020) on the fact that the institutions were constrained by being reluctant in raising awareness on the OERR, policy establishment, issues of support and interest to the invention. However, few institutions of the sub-Saharan Africa had an OERR policy but was not implemented and resulted to 82 per cent of the lecturers being not aware of the OER license (Creative Commons) for scholarly communication.

In West Africa, particularly in higher learning institutions of Nigeria and Ghana, studies indicate that the performance of the OERR in these countries has been influenced by various factors which are not limited to users' awareness to the OERR, support from the institution management, copyright and other legal issues and relevance of the OER. Other factors include the sustainability setbacks, quality of the OER, availability of ICT infrastructure, internet connectivity, financial issues, advocacy of the OERR, intellectual property rights, technological skills and knowledge on the OERR (Igwe, 2014; Ezema & Okafor, 2015; Nwokedi & Nwokedi, 2018; Oguche, 2018; Pete *et al.*, 2018; Loglo & Zawacki-Richter, 2019; Miracle, 2020; Ofoegbu, Asogwa & Ogbonna, 2021). Similarly, Nyambi and Maynard (2012) and Kassahun and Nsala (2017) in Zimbabwe and Botswana respectively observed that knowledge and technical know-how, quality of the OER, political issues, communication, legal and copyright aspects, government and higher learning institutional support and availability of subject based librarians influenced the performance of the OERR in these countries.

Moreover, a number of studies on the OER have been conducted in the United Republic of Tanzania (URT) and indicate that both public and private higher learning institutions have been influenced by different factors toward the proliferation of the OERR. In this, Samzugi and Mwinyimbegu (2013), Mtebe and Raisamo (2014), Muneja and Ndenje-Sichalwe (2016) and Mwinyimbegu (2018) observed the constrains related to Internet connectivity, infrastructures for the OERR, issues of awareness, digital literacy among the OER users, geographical location of users, the OERR policies and intellectual property rights, curriculum compatibility with the OER, skills to create and use the OER and quality issues of the OER. On the one hand, factors related to the aforementioned issues, availability of expertise, support, commitment and interest of the institutions' managements and sustainable resources including man power and financial aspects were mentioned to influence the performance and sustainability of the OERR in higher learning institutions of the United Republic of Tanzania. Factors influencing the OERR performance in higher learning institutions of the developing countries are broadly the same throughout the reviewed literature. It is imperative that the identified factors are critically taken into account to ensure that the establishment the OERR does not suffer the consequences of technology lapse and the value for the efforts and resources invested in is appreciated. On a serious note, higher learning institutions have to ensure that attention on the OERR is given through proper planning with tangible strategies, resources and knowledge for promoting effective management, application, integration, preservation and dissemination of the OER to the community. However, human resource capacity building, financial resources, infrastructures, commitment, innovativeness, advocacy and marketing of the OERR are paramount in improving performance and sustainability. The academic community may find the OERR useful to their career provided that the quality of the OER is comprehended for relevance and acceptability. The OERR policy has to be established and updated for quality control and procedures for backup to enhance security, disaster management and protection of the legal rights including the intellectual property rights and open licensing.

Conclusions

The aim of this paper was to undertake a comprehensive assessment of previous research studies on open education resources repository for scholarly communication in the developing countries. This is an essential evaluation that is conducted to discover how higher learning institutions in developing countries

dealt with the issue of Open Education Resources Repository in scholarly communication and visibility in this region of the world. The inquiry begins with a brief explanation of the current advancement of technology in general and the introduction of the Open Education Resources Repository in particular for scholarly communication and knowledge management. This was purposefully done to comprehend the significance and background of the underpinning phenomenon. It also included a discussion of the notion of open education resources in its broad perspective. Various literatures on the essence of Open Education Resources Repository for scholarly communication in higher learning institutions of the developing countries were reviewed and classified into three major themes. The themes included Open Education Resources Repository awareness among users, the level of performance and factors influencing the performance of the Open Education Resources Repository in developing countries. In the discussion section, explanations of the key subjects discussed as well as the primary prospects for future inquiry were provided. It can be concluded that the research into open education resources for scholarly communication in higher learning institutions in developing countries is increasing; Various researchers are investigating issues in this area following the changing technology and user needs of the academic community. This is justified by a number of studies accessed from four different aggregate tools. The fact that studies on Open Education Resources Repository in developing countries' higher learning institutions are increasing, signifies that the relevance and importance of the open access tool for promoting scholarly communication or researchers' interest on this area is going up.

Limitations and Areas for Further Investigation

The present study, like every review study, was hampered by a variety of limitations. For example, from 2010 to 2022, all of the publications analysed were about Open Education Resources Repository for scholarly communication in developing countries' higher learning institutions and were sourced from Google scholar, ResearchGate, OpenPraxis and Refseek aggregates. As a result, this research does not include Open Education Resources Repository for scholarly communication in other areas of the universe. A systematic review in this study was employed and thus other studies should undertake a meta-analysis on Open Education Resources Repository in the developing nations. As a result, a meta-analysis study to find how often and significant elements on effective Open Education Resources Repository for scholarly communication in the developing

nations is widely anticipated. It is also said that Open Education Resources Repository for scholarly communication is a growing trend, particularly in the developing nations; thus, other researchers should undertake studies utilising more powerful statistical data analysis techniques. This is because the bulk of the studies examined did not go beyond descriptive and inferential statistics for data analysis.

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