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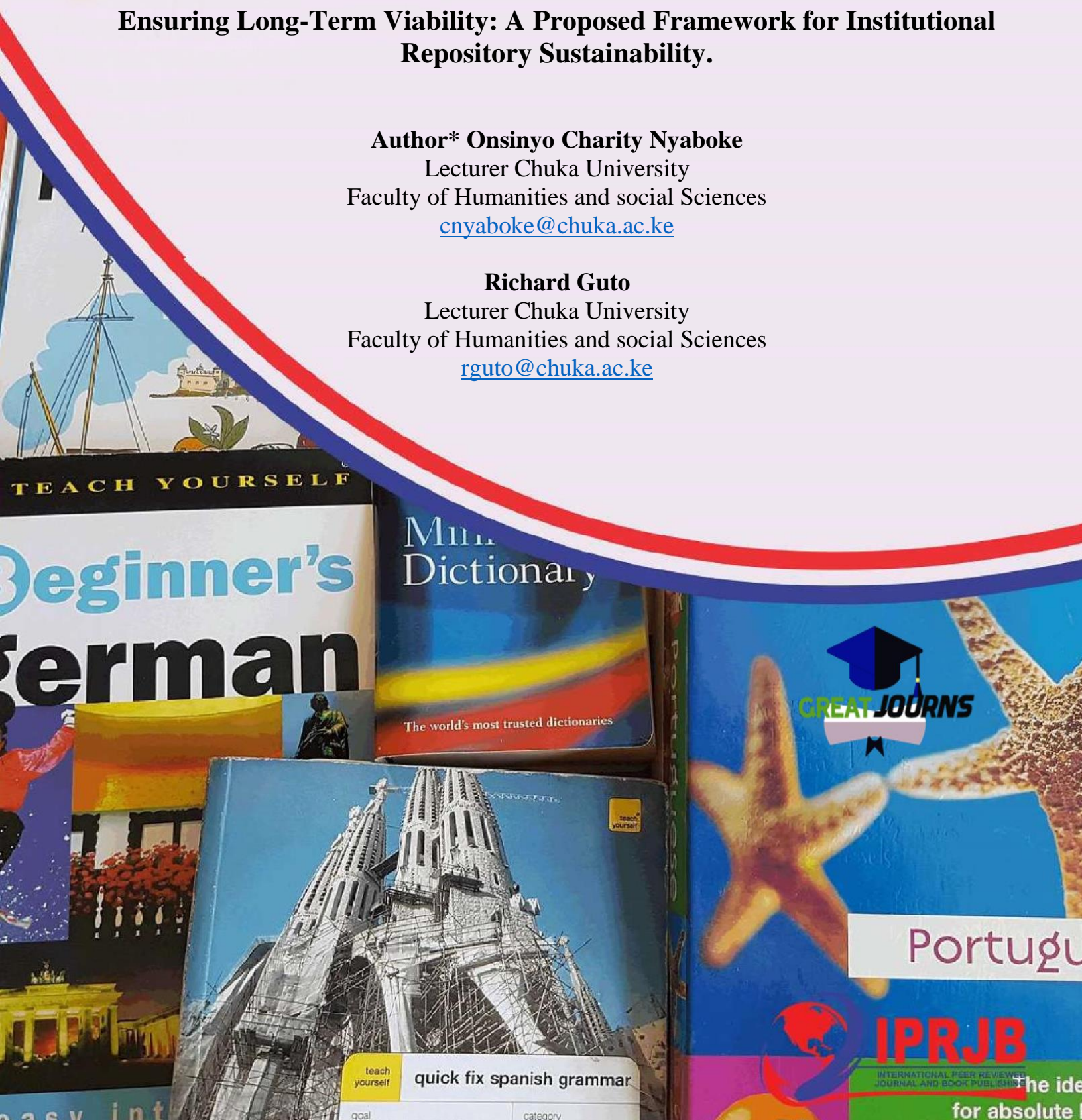
Ensuring Long-Term Viability: A Proposed Framework for Institutional Repository Sustainability.

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1.0 INTRODUCTION

Universities in developing countries are faced with the challenge of accessing scholarly information to support their research and teaching mandate (Ammarukleart 2017:16; Saina 2022:1). The increased cost of academic publications like books and journals, the significant growth in the overall volume of research, and the long latency in the traditional print publications paradigm have affected research and teaching in institutions of higher learning (Ukwoma and Dike 2017; Saini 2018). As such, institutional repositories (IRs) are developing as vehicles to possibly support universities achieve their roles (Jain, Bentley & Oladiran 2016; Wesolek 2016: xv)

An IR is defined as a digital archive of intellectual output created by the faculty, research, staff and student of an institution of higher learning and accessible to end users both within and outside of the institution with few if any barrier to access (Lynch 2003; Murugathas & Balasooriya 2014; Jain et al 2015; Demetres, Delgado & Wright 2020). These digital documents consist of all electronic publications such as thesis, journals, books and conference papers (Okumu 2015; Kodua 2020).

Despite an increase in the adoption of IRs globally, there is a growing concern regarding the sustainability of OAIRs (Burns et al. 2013; Nkiko, Bolu & Chijioke 2014; Francke, Gamalielsson, & Lundell 2017). Like all new ICT driven innovations, maintenance and running cost, perceptions or attitudes towards change or innovations, ICT infrastructure, content quality, institutional policies, copyright, and skill sets or competencies of personnel have been identified as critical to the sustenance of IRs (Corletey 2011; Thompson et al 2016; Martin-Yeboah et al 2018; Anyaoku et al 2019).

This paper presents a model for the sustainability of IRs, aiming to address the various challenges that threaten their long-term viability. By exploring the essential elements that contribute to sustainability, the proposed model offers a comprehensive framework that institutions can adopt and adapt to their specific needs.

2.0 LITERATURE REVIEW

Despite being extensively discussed and described sustainability and sustainable development continue to be challenging to operationalise (Ng & Nicholas 2013; Meyer & Marais 2014; Ford & Dlamini 2017). The term sustainability remains ill-defined as it lacks a universal definition (Galpin & Hebard 2015) with more than 70 diverse meanings put forward by numerous research (Owens & Legere 2015; Habidin et al 2015; Ratiu & Anderson 2015), depending on how the sustainability is looked at (Barkemeyer et al 2014; Owens & Legere 2015).

Sustainability is “not” how to keep going in a linear sustained fashion but rather it’s a constant enhancement, adaptation and cooperative critical thinking notwithstanding unpredictable difficulties that continue to emerge (Fullan 2016; Ricky 2012). Sustainability means the ability to

continue an activity that is related to environment, economic and social activity indefinitely (Markulev & Long 2015).

In the IR context, the term sustainability refers to decisions taken during the commencement period of a project with cognizant of the future aims of the IR (Chowdhury 2016; Hayibor 2017).

Most studies on sustainable development have dealt with environmental aspects, the welfare of human beings, and financial development. But, in recent times, focus on sustainability has included electronic long-term preservation of information, software engineering, and information systems. For instance, the Blue-Ribbon Task Force on Sustainable Digital Preservation and Access in 2010 introduced a complete report on the financial difficulties encountered while ensuring sustainable access to electronic information (Smith 2010).

By and large, sustainability in relation to library studies, information science and IRs has not been well investigated (Nolin 2010; Chowdhury 2012). Difficulties in defining the concept of sustainability has hindered research in library and information science studies since sustainability is a multi-faceted concept (Eschenfelder 2016).

Jankowska (2010) carried out a study on sustainability challenge for academic libraries and recommended that all libraries should align their strategic plans to social, environmental and financial sustainability. Future choices regarding library publications, constructions, automation, technologies and library cooperative efforts should be guided by sustainable approaches. The choices should not only consider the financial expenses on the library collections and human resources but should also include the price of waste produced calculated using the “ecological footprint” arising from library procedures and services.

Chowdhury (2014) in his study on sustainable digital libraries concluded that, for electronic libraries to be sustainable, financial, environmental and social sustainability must be looked into. The study recommends that both a conceptual model and a theoretical framework should be used to investigate the sustainability of electronic libraries. It shows that the sustainable business models to sustain electronic libraries should also promote impartial access supported by definite design and usability policies that promote easier, improved and affordable access; support the individual, organisational and social values of clients; while conforming to set guidelines and regulatory frameworks of the respective regions, nations and organizations. Various factors that influence the sustainability of DLs should not be studied in isolation but together in order to build DLs that are financially, socially and environmentally sustainable.

Nkiko, Bolu, and Michael-Onuoha (2014) on their paper “Managing a Sustainable Institutional Repository: The Covenant University Experience” illustrated how vigorous and technical it was to build and sustain the covenant University IR which for years had reliably been declared position one in Nigeria's repositories following webometric rankings. The authors warn other scholars on

the risks of relinquishing their copyright to Journal publishers because it strips them of their ownership rights, and this might prevent them from depositing their publications in IRs consequently affecting the content growth and visibility of scholarly works. The authors further insist on the importance of having backup mechanisms to reduce the chances of data loss in case of disasters to ensure sustainability of IRs.

Eschenfelder (2016) in his attempt to describe the sustainability of digital repositories including archives and libraries show how scholars in LIS authors perceive the sustainability idea in relation to IRs, digital archives, and libraries. Findings conclude that the sustainability concept is not a common a subject as one might assume. Findings indicate that most scholars deliberate sustainability shallowly instead of discussing it into details in-depth. Most scholars looked at sustainability from the perspective of technology, administration, partnerships or finances.

Zheng (2016) investigated difficulties encountered in an attempt to preserve electronic scholarly works and to encourage the growth of sustainable backing mechanisms. Based on a systematic literature analysis, the paper focuses on building a framework of sustainability matters and tools. For sustainable support mechanisms of preservation of electronic scholarly works, the study concludes that the long-term sustainability includes format sustainability, system sustainability, and service sustainability for digital preservation, and it entails management, fiscal, and institutional sustainability.

Okoroma (2018) on his study about technological and infrastructural factors affecting IRs in University Libraries in Nigeria concluded that poor internet connection, technological obsolescence, unreliable electricity connectivity, as a result of insufficient funds were some of technological and infrastructural difficulties distressing IRs in university libraries in Nigeria. The research study concluded that more funds through special IR budgetary apportionment by the universities' management and good internet connectivity should be provided. The study also advocated for the use of solar energy to curb the problem of power interruptions.

Masenya, Tlou & Ngulube (2020), carried out research to determine factors that can influence the sustainability of electronic preservation in libraries associated with institutions of higher learning with the aim of coming up with a conceptual model of preservation that applies to libraries in higher learning institutions. The results indicated that South Africa's academic libraries are greatly affected by changes in technology. In an effort to preserve their electronic scholarly works, the libraries are limited by the absence of institutional good will and participation, lack of guidelines and standards on digital preservation, absence of established digital preservation standards, policies and procedures; inadequate resources; lack of skills and training; lack of funding; inadequate teamwork efforts with partners and the rate at which technology becomes outdated. This study finally suggests that for the institutions to overcome most of their digital preservation problems they need to look into these factors. The study proposes a conceptual model for

preserving of electronic publications in libraries of higher learning institutions, mapped with the Open Archival Information System (OAIS) reference model.

Yeboah and Kwame (2020) in their research on "Towards institutional repository sustainability" concluded that:

- i) Institutions seeking to ensure the sustainability of their IRs need to allocate more resources and time to explain the importance of IRs to all stakeholders.
- ii) Advocacy campaigns about IRs should be carried out both physically and online using avenues such as library websites, university events, billboards etc.
- iii) IPR issues should be addressed conclusively to encourage scholars to publish their content in the IRs
- iv) Reward systems to contributors of IR content could be introduced to motivate other scholars to also deposit their works.

All these studies suggest that for any digital archive such as an IR to be sustainable, then technological, economic, social and institutional factors of sustainability must be taken into consideration.

Key findings in the literature indicate that:

- Policy implementation, effective distribution of resources, legal challenges, cooperation and collaborations, technical competence, and institutional backing are all important variables that are essential to the sustainability of digital preservation (Corrado & Moulaison 2014; Council of Canadian Academies 2015).
- To build sustainable IRs, all the four (4) areas viz. technical, economic, social and institutional sustainability should be taken into consideration (Chowdhury 2014). Long term sustainability of IRs covers the concepts of economic, technological, social and institutional sustainability (Zheng 2016).
- In as much as university libraries strive to preserve their digital content, they are faced by challenges such as lack of involvement and commitment by organisations, lack of electronic preservation standards, guidelines and procedures; lack of enough finances; lack of technical know-how; inadequate teamwork efforts and partnerships; and technological obsolescence (Masenya, Tlou & Ngulube 2020).

3.0 METHODOLOGY

This study sought to develop a framework that would enable libraries to build sustainable IRs. Kivunja (2018) says that a framework should gather ideas and information on a topic. The goal of

these frameworks should be to explain and support important concepts and their connections. Glanz (2008) notes that frameworks are collections of thoughts and concepts that explain or forecast events or situations by identifying relationships between variables.

Thus, the proposed IR sustainability framework tries to bring together in a pictographic form, ideas/concepts, the interactions between them, and their power of forecasting IR sustainability. The framework illustrated in Figure 1 below is grounded on the literature review, theoretical framework, study findings and recommendations.



Figure 1: Proposed sustainable IR framework (Source: author,2024)

3.1 Explanation of the framework

The framework presented above attempts to show and link factors that could lead to the sustainability of IRs. Figure 1 above depicts that sustainability resides at the interactions amongst the four (4) factors of sustainability namely: financial, technological, social and institutional.

The framework identifies four (4) sustainability factors that are essential in ensuring the sustainability of IRs. This is to say that sustainability of IRs is attainable if a balance is maintained amid all the various factors and their effects. The sustainability factors, together with their elements are connected to each other using lines to show the correlation between these factors. The arrows depict that all the factors contribute to the sustainability of IRs. It may be noted that one factor of sustainability can positively or negatively impact on the other forms of sustainability as described below.

3.1.1 Technological factors and sustainability of IRs

For a sustainable IR, technological and infrastructural matters must be looked into (Okoroma 2018:252). ICT & Infrastructure are the key enablers of IRs. They form the backbone of all digital library activities and functions that are related to the creation as well as use of IR content. The framework recommends that:

- Libraries should choose a software that is relatively cheap, easy to customize, can support various formats, is interoperable and is searchable through the web. Using open-source software is considered a budget friendly option because there are no expenses for buying or renewing license for the software. Martin-Yeboah (2015) states that several organizations like using DSpace because it has good technical help and can work with different types of content. One of the main reasons why it is popular is because many people use it. People usually prefer software that can be installed quickly, and it usually takes only a few days to set up a basic version of the software.
- Libraries should acquire necessary IR hardware requirements. The library should add more computers to the library to enable users to efficiently use the IRs.
- The internet is important for the IR to work. The problem has been that the internet connection is not strong enough, so it takes a long time to download or upload files. management should make sure that the companies providing internet increase the internet bandwidth to make it reliable. The lack of a dedicated standby electric power generators for libraries causes interrupted access to the IR in case of blackouts. A dedicated power backup generator should be installed in the university to avoid downtime.

3.1.2 Social factors and sustainability of IRs

Kolk (2016) says that social sustainability does not strive to meet the needs of each individual, but it provides a favorable environment for everyone to have the ability to meet the needs that they yearn for. Social factors include existence and awareness of IRs, content recruitment, information literacy skills and IR utilization. The framework recommends that:

- Libraries should increase awareness of IRs by creating adverts in different places like the library's website, posters, the radio, talking to people and mentioning them during events at the university. It's best to do this before starting the repository so everyone on campus is most likely to agree and support it. It is important to let people know about IRs so that they understand what it is, why it's useful, and how they can contribute to the project's success (Chilimo, 2016). Understanding the repository is important for sustainability because it helps you learn about it and shapes your thoughts and feelings about it (Atiso et al 2017).
- Libraries need to encourage scholars to publish their works in the IRs. The amount of research and content submitted in an IR is important for it determines the sustainability of an IR. (Sang et al 2021:81).
- Users of IRs need to be equipped with IL skills and knowledge. These skills are the facilitators or key enablers of IRs. Disciplinary knowledge and appropriate skills such as information skills, digital skills, writing & communications skills, etc., are essential for both

the creation and use of information and data. Training for library users is very important because it helps them become better at searching for information, makes them feel more confident in using library resources, and encourages them to use the library more often. (Omotunde 2017).

3.1.3 Financial factors and sustainability of IRs

For any project to succeed, funds must be secured into it to sustain its running. This study found that sustainable library funding is key to sustainable IRs. The framework recommends Libraries should find ways to make more money by getting donations from other companies and organizations. They should not just rely on getting money from the government or other funders.

3.1.4 Institutional factors and sustainability of IRs

Institutional sustainability factors refer to factors connected to the university's guidelines and actions that the library cannot control but have direct impact on the development and implementation of IRs. Institutional factors include policy frameworks, management support, stakeholders' involvement and IR staff skills. In view of this, the framework recommends that:

- University libraries should establish and publicize IR frameworks. Further, all stakeholders should be involved during the formulation of IR policies. Martin-Yeboah, Alemna and Adjei (2018a; 2018b) found that academic institution repositories are most likely to remain sustainable when every group involved, such as staff and students, is committed to their creation, development and promotion through cooperation. A good IR policy plan is very important to determine how a repository will work. It helps to manage the repository every day and plan for its future. (JISC infoNet 2020).
- University libraries should seek management support.
- There is a need to recruit/ train IR staff with necessary skills to run all the activities of an IR.

3.2 Research implications for theory, policy and practice

The reason for doing studies is to solve research problems and suggest solutions. (Shibambu 2019:155). This paper has highlighted the influence of four (4) key factors that affect the sustainability of IRs in Kenyan libraries, prominence being on risk exposures and how they can be reduced. This study had similar results to the ones of Karanja (2015), Njagi and Namande (2018) and Masaya, Tlou & Ngulube (2020), to the extent that they all pointed at the four (4) sustainability factors pertaining to the sustainability of IRs in Kenyan universities. This study contributes to the existing literature on sustainability in LIS where empirical studies are noticeably inadequate. Apart from contributing to literature, the suggested ideas and plan for lasting digital storage can be used by colleges and other important groups in Kenya to improve long-term digital archiving methods.

This research aims to help decide how to create and put into action policies about sustainable information repositories at both national and organizational levels.

The establishment of sustainable IRs in Kenyan universities will pave way for better access to quality scholarly literature which will become freely available because of the open access mode of these repositories. There will be a reduction of time and cost in acquiring scholarly materials for the researchers because of the local availability of the content. The implications are a network of repositories that will not only provide scholarly literature but will provide the same at a lesser cost which will be a major boost for the cash-strapped African libraries.

Sustainable IRs will also result in the increase of research and teaching tools for Kenyan researchers and lecturers. With every institution publishing its intellectual output into their respective repository, the chances of duplication in research in a specific field among the institutions and across the continent will become less. At the same time research in a particular field in different geographical, ethnical, cultural and intellectual environment will also become a possibility. All these different dimensions to research will result in an increase of research output which will eventually result in quality research and development projects in Africa.

Sustainable IRs will also improve the visibility of Kenyan researchers and their respective institutions of higher learning. The visibility and integrity of each institution will be determined by the work reflected in their repositories.

IV: CONCLUSION

This paper has presented a model for the sustainability of institutional repositories, offering a comprehensive framework that institutions can adopt to ensure the long-term viability of their digital archives. The model emphasizes the need to balance of financial, technological, social and institutional factors to ensure the sustainability of IRs.

By adopting this model, institutions can enhance the impact of their repositories, ensuring they continue to serve as valuable resources for their communities. Future research should explore the application of this model in different contexts, as well as the development of tools and resources to support institutions in implementing these strategies.

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