THE DLIS 2022

Information and Knowledge Management in the 4th Industrial Revolution and COVID-19 Era

Proceedings of The 2022 DLIS 4th Biennial Conference

Hosted by Department of Library and Information Studies (DLIS)

25 - 27 April, 2022

VIRTUAL CONFERENCE

Editor: Prof. P. Jain, Prof. N. M. Mnjama, Prof. B.N. Jorosi & Prof. O. Oladokun

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The Organizing Committee of the 4th DLIS Conference on "Knowledge and Information Management in the 4IR and Covid-19 Era", would link to thank the Office of the Vice-Chancellor, University of Botswana, the Public Relations Office, Information Technology Department, Centre for Academic Development (CAD), University of Botswana library, the Dean's Office, Faculty of Humanities, the Head and colleagues in Department, Library and Information Studies for their support in organizing this conference . To all our local and foreign delegates, we say thank for your contribution to the success of this conference. There would not be any conference without your contribution.

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PREFACE

INFORMATION AND KNOWLEDGE MANAGEMENT IN THE 4TH INDUSTRIAL REVOLUTION AND COVID ERA

This volume represents the proceedings of a conference hosted by the Department of Library and Information Studies, at the University of Botswana from 25 to 27 April, 2022. The conference, which was the 4th DLIS Biennial International Conference, was themed: "*Information and Knowledge Management in the 4th Industrial Revolution and Covid- Era"*. A total of **21** papers were submitted and are included in these conference proceedings.

The *Fourth Industrial Revolution* (4 IR) represents a fundamental change in the way we live, work and relate to one another. It is a new chapter in human development, enabled by extraordinary technology advances commensurate with those of the first, second and third industrial revolutions. These advances are merging the physical, digital and biological worlds in ways that create both huge promise and potential peril. The speed, breadth and depth of this revolution is forcing us to rethink how countries develop, how organizations create value and even what it means to be human. The *Fourth Industrial Revolution* is about more than just technology-driven change; it is an opportunity to help everyone, including leaders, policy-makers and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centered future.

To this end, the conference had invited three keynote speakers, experts in the areas of knowledge management, system management and archive and records management. Day one, Professor Wole Michael Olatokun on "Knowledge Management as Catalyst of Innovation in the Fourth Industrial Revolution: Lessons and Implications for African Universities". Day two, Professor K. H. Moahi presented a keynote address on the "Fourth Industrial Revolution Technologies and information systems for the 21st Century" and on day three Professor James Lowry made an excellent key note address on "Design Justice in Records Systems: The Covid Pandemic and Fourth Industrial Revolution".

The proceedings aptly start with papers of the 4th IR. Professor Priti Jain examined perspectives of institutions of higher learning in light of both the 4th IR and the Covid pandemic while Musediq Tunji Bashorun's paper focused on Embedded Open Science as Roadmap for Science,

Technology, and Innovation in Knowledge-Driven Society in the 4th IR and COVID-19 Era. The third paper in this section was by Aobakwe Ledikwe which sought to answer a major question on what triggers the behaviour of millennials towards the adoption of the Covid alert application, evidence from South Africa.

The second part of the proceedings is focused on libraries and their response to Covid-19 and seeks to demonstrate how the libraries functioned during the Covid- 19 pandemic. The section commences with a paper by Kudirat Abiola Adegoke and Gideon Babalola which focused on Academic Libraries in IoT Era: Moving Towards Smart Services. This is followed by a paper by Liah Shonhe who examined the Provision of Academic Library Services in the Wake of Covid-19: Students' Perspectives at the Institute of Development Management in Gaborone, Botswana. The third presentation under this section is by Similani Thatafalang Dema and Olugbade Oladokun which assessed librarians' views on information retrieval at the University of Botswana. The last presentation in this section is by Josiline Chigwada and Rosemary Maturure, two practicing librarians from Zimbabwe which focused on the changing landscape of academic librarianship in the covid-19 era in Zimbabwe.

Part Three of the proceedings is devoted to records management issues. Although the *creation and management of records* has always been important from ancient times to today, the rapidly changing digital and online technologies of the 4th IR have introduced additional challenges to create, capture and manage records more important than ever before. Consistent with this notion, records management is covered by three papers. First, Nhlabatsi and Mosweu shed light on the status of the management of social media records at the Government Press Office in Eswatini. This is followed by a mapper by Manyeke who examines Data protection within 4IR: opportunities and challenges for records management in Africa The last paper in this section is by Professor Nathan Mnjama who tackles records and Covid-19 highlighting some of the records management lessons that have been learnt by organizations during the Covid-19 Pandemic. .

Part Four of the proceedings is focused on issues of education and training. The first paper in this section by Thatayaone Segaetsho and Segolame Samuel focusses on Exploring Microsoft Office Teams' service quality on eLearning offered to Masters on Archives and Records Management Students at University of Botswana. This is followed by a paper on the Conduct of Academic Services and Hiccups in Higher Education Institutions (HEIs) in the 4IR Botswana by Prof. Olugbade Oladokun. Alpheus Mogwe's paper discusses how University of Botswana is leveraging digital transformation to improve Customer Experience in Tertiary Educational Institutions (TEIs). The paper by Sifundo Nkomo and Walter Matli looks at digital transformation as bridging the gap between the haves and have not within a Southern African secondary school context during the Covid-19 Era. Two other interesting papers included in this section are: a paper by Janet Adekannbi and Oyindamola Ipadeola who present the findings of a study on Undergraduate Students' Perception on Emergency Remote Learning During Covid-19 in Nigeria and a paper by Boloka Mamotshabo Johanna on Framework for information provision to enhance teaching and learning in rural schools during Covid 19 pandemic in South Africa. Another paper in this section is a paper on marketing information and knowledge services of electronic learning centres in the 21st century era in the City of Johannesburg public Libraries, South Africa - Sifiso Mbambo and Glenrose Jiyane.

Part Five of the proceedings is devoted to knowledge management and includes papers from five experts in this area. Ndlovu and Dewah discuss knowledge management practices and service delivery among psychiatry nurses at Ingutsheni Central Hospital in Zimbabwe. Rikard Von Sydow presents a Scandinavian case study of Covi-19, Governmental Transparency and the public health agency. Another contribution is a paper by Omotayo titled: open access initiative: A gateway for knowledge management in the 4th IR and Covid Era. The final paper in the proceedings is a presentation by Benson Serara Motswetla titled An Institutional theory perspective of eGovernment Implementation in Botswana which seeks to show how ICTs are being employed to manage records and information in a Land Board in Botswana.

THE 2022 DLIS 4TH BIENNIAL CONFERENCE

INFORMATION AND KNOWLEDGE MANAGEMENT IN THE 4TH" INDUSTRIAL REVOLUTION AND COVID-19 ERA, 25-27 APRIL, 2022

TABLE OF CONTENTS

PART ONE: ICTS AND FOURTH INDUSTRIAL REVOLUTION

1. The 4th Industrial Revolution and COVID-19 Pandemic: Opportunities and Challenges from Students' Perspectives in Institutions of Higher Learning in Botswana – **Priti Jain** 1 – 23
2. Embedded Open Science as Roadmap for Science, Technology, and Innovation in Knowledge-Driven Society in the 4th IR and COVID-19 Era - **Musediq Tunji Bashorun** 24-43
3. What triggers the behaviour of millennials towards the adoption of the Covid alert application? Evidence from south Africa- **Aobakwe Ledikwe** 44- 65

PART TWO: LIBRARIES IN COVID – 19 AND 4 IR

4. Academic Libraries in IoT Era: Moving Towards Smart Services **- Kudirat Abiola Adegoke and Gideon. A. Babalola** 67 -85
5. Provision of Academic Library Services in the Wake of Covid-19: Students' Perspectives- **Liah Shonhe** 86 -105
6. Information retrieval challenges at the University of Botswana Library in the 4IR Era Assesssing the librarians views on information retrieval difficulty at the University of Botswana library in the 4ir erax. **Similani Thatafalang Dema and Olugbade Oladokun** 106 – 122
7. The changing landscape of academic librarianship in the covid-19 era in Zimbabwe - **Josiline Chigwada and Rosemary Maturure 123- 138**

PART THREE: RECORDS MANAGEMENT

8. The Status of the Management of Social Media Records at the Government Press Office (GPO) in Eswatini- **Thembelani Nhlabatsi and Tshepho Mosweu** 140-160

9. The readiness of public sector records managing organizations in implementation of the Botswana Data Protection Act of 2018: A case of Public Procurement and Disposal Board (PPABD - **Manyeke Manyeke** 161 -177

10. Records Management and Covid – 19: What Lessons have we Learnt?- **Nathan Mnjama** 178-192

PART FOUR: EDUCATION AND TRAINING IN THE 4IR AND COVID ERA

11. Exploring Microsoft Office Teams' service quality on eLearning offered to Masters on Archives and Records Management Students at University of Botswana - **Thatayaone Segaetsho and Segolame Samuel** 194 - 224

12. The Conduct of Academic Services and Hiccups in Higher Education Institutions (HEIs) in the 4IR Botswana - **Olugbade Oladokun** 225 - 248

13. Leveraging digital transformation to improve Customer Experience in Tertiary Educational Institutions (TEIs): The case of University of Botswana- **Alpheus Mogwe** 249 - 270

14. Digital transformation: bridging the gap between the haves and the haves not in Southern African secondary schools in the Covid-19 era- **Sifundo Nkomo and Walter, M Matli** 271- 290

15. Marketing information and knowledge services of electronic learning centres in the 21st century era in the City of Johannesburg public Libraries, South Africa - **Sifiso M. Mbambo and Glenrose V. Jiyane** 291 - 309

16. Undergraduate Students' Perception on Emergency Remote Learning During Covid-19- **Janet Adekannbi and Oyindamola Ipadeola** 310-327

17. Framework for information provision to enhance teaching and learning in rural schools during Covid 19 pandemic - **Boloka Mamotshabo Johanna** 328-341

PART FIVE: KNOWLEDGE MANAGEMENT

18. Knowledge management practices and service delivery among psychiatry nurses at Ingutsheni Central Hospital - **Simelubuhle Ndlovu and Peterson Dewah** 343-364

19. COVID-19, Governmental Transparency and the Public Health Agency of Sweden - **Rikard Friberg von Sydow** 365-378

20. Open access initiative: A gateway for knowledge management in the 4th Industrial Revolution and Covid-19 Era - **Funmilola O. Omotayo** 379-397

21. An Institutional theory perspective of eGovernment Implementation in Botswana - **Benson Serara Motswetla** 398-413

ABOUT KEYNOTE SPEAKERS



Professor Wole Michael Olatokun

Professor Wole Michael OLATOKUN is a UNESCO Fellow and professor of Social Informatics, Knowledge Management and ICT Policy. He holds master and doctorate degrees in Information Science obtained from the Africa Regional Centre for Information Science (now Department of Data and Information Science), University of Ibadan, Nigeria. He started his teaching and research career in October 1997 and rose through the ranks to become professor with effect from 1 October, 2012. He was Visiting Senior Lecturer at University of Botswana between 2008 and 2010 and Visiting Scholar at the Faculty of Information and Media Studies, University of Western Ontario, Canada between November 2013 and February 2014. He is a versatile professor who teaches and has published extensively in the areas of Analysis of National ICT policy issues, Digital Literacy, Social Informatics, e-Governance, Knowledge Management, ICT and Development, Information Ethics, Digital inclusion, Gender and ICT and Indigenous Knowledge. Some of his key research experiences include:

1. Bill & Melinda Gates Foundation's Sesigo Impact Assessment Baseline Study at Northern Botswana, January – December 2009
2. Project on an Impact Assessment Study of HIV/AIDS intervention in Botswana, February – July, 2010
3. Catholic Relief Services (CRS) Mid-Term Review of Sustainable Mechanisms for Improving Livelihoods and Household Empowerment (SMILE) project August 2016-March, 2017
4. Tertiary Education Fund (TETFUND) Project on Developing Standards for Monitoring, Assessment, and Evaluation of Peace and Conflict Management Projects in Nigeria – 2020-2022

Professor Olatokun has published ninety-eight papers in form of books, chapters in books, refereed conference proceedings and refereed, Scopus indexed local and international journals. He has served as external examiner/assessor in several institutions/universities in Nigeria, India and South Africa. He has also served and still serving as reviewer and editorial board member to several journals both in Nigeria and outside. Currently, he is the Editor-in-Chief of the Journal of ICT Development, Applications and Research. Professor Olatokun was the Director of Africa Regional Centre for Information Science, University of Ibadan (2014-2020) and Honorary Professor at the Information Studies Programme, School of Social Sciences, University of KwaZulu-Natal and Department of Information and Knowledge Management, University of

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 **Professor Kgomotso Moahi**

Kgomotso Moahi has worked in academia for the past 37 years. She started her academic career at the University of Botswana as a Documentalist, after which she joined the Department of Library nad Information Studies as a lecturer. As a professor in library and information science she has researched and published in the areas of health information systems, library sciene, and indigenous knowledge systems. She occupied several administrative and management positions at the University from Departmental chair, Dean of the Faculty of Humanities, and acting appointments as DVC Academic Affairs and Vice Chancellor. After 35 years of service at the University of Botswana, she moved to the Botswana Open University where she is currently the DVC Academic Services as well as Research Innovation and Partnerships.

 **Professor James Lowry**

James Lowry is the founder and director of the Archival Technologies Lab (ATL) at Queens College, City University of New York, where he is an Assistant Professor in the Graduate School of Library and Information Studies. He is an Honorary Research Fellow and former co-director of the Liverpool University Centre for Archive Studies, where he taught following a ten year career in archives and records management. As a practitioner, James worked in Australia, Europe, Africa and the Caribbean. James is convenor of Archival Discourses, the International Intellectual History of Archival Studies research network, and editor of the Routledge Studies in Archives book series.

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PART ONE

ICTS AND FOURTH INDUSTRIAL REVOLUTION

THE 4TH INDUSTRIAL REVOLUTION AND COVID-19 PANDEMIC: STUDENTS' PERSPECTIVES ON THE OPPORTUNITIES AND CHALLENGES IN INSTITUTIONS OF HIGHER LEARNING IN BOTSWANA

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Abstract
The Fourth Industrial Revolution (4IR) and the COVID-19 have impacted on all facets of life, the economy, development, society, the higher education system in unprecedented ways. The pandemic crisis incited educators to reconsider teaching and learning practices and forced higher education to shift its bases to remote (online) mode. Almost all universities and colleges have started teaching their students through online platforms. The COVID-19 pandemic became a huge challenge to education systems all across the world, particularly in developing countries. The 4IR technologies became a rescue to continue normality in life and has proven the boon to fight COVID-19. However, no empirical study has been undertaken to assess the impact of Covid 19 and 4IR in Institutions of Higher Learning in Botswana in terms of opportunities and challenges faced by learners. There was a need of such study in order to improve online teaching and learning. This study explored the opportunities and challenges of online teaching and learning activities from students' perspectives and establishes the 4IR technologies used for teaching and learning by various Institutions of Higher Learning in Botswana during and post COVID-19 and 4IR era. The data was collected through an online survey tool (Google forms) using a snowballing sampling technique. The study revealed the main opportunities as: improved use and adaptability of e-leaning platforms, building an education system for lifelong learning, flexibility in learning, taking control of own learning, and online learning is more dynamic. The major challenges were identified as: Internet problem, inadequate technological infrastructure, low bandwidth, and, financial constraints. The study recommends for investment in 4IR ICT technologies, capacity building, adequate budget and Government support.

Keywords: Fourth Industrial Revolution (4IR), COVID-19 Pandemic, Botswana,Higher Education, Online Teaching-Learning, Challenges, Opportunities.

1. INTRODUCTION

On 11th March 2020, the World Health Organisation officially declared the outbreak of the Coronavirus disease (Covid-19) a global pandemic (Cuccinotta & Vanelli, 2020). The disease was first detected in human beings in China in December 2019 and quickly spread to all other parts of the world (World Health Organisation, 2021). Following the announcement, like other countries, Botswana government closed all Universities and centres of Education by 23rd March

2020. The pandemic has necessitated great shifts from face to face to working from home, many of the global citizens particularly in Africa and developing countries have been left out by this radical change. Ger and Saes (2020) viewed COVID-19 pandemic as a catalyst for the fourth industrial revolution. Despite several challenges, the pandemic also offers a unique opportunity to re-think and do things differently using 4IR for a better, fairer and more inclusive society (Ger and Saes, 2020).

Botswana does not want to be left behind in this Covid-19 and 4IR era. To ensure the adoption 4IR, Botswana hosted a national forum in August, 2019 to take stock of the Botswana's readiness for implementation and exploitation of 4IR. In the Official Opening, the Minister of Tertiary Education, Research, Science and Technology, Mr Thapelo Olopeng said, "Botswana should review its readiness for the 4IR and move towards actionable tasks and targets in order to ensure that it derives benefits as per Vision 2036 and NDP 11 aspirations" (BITRI, 2019). On 25 November, 2021, Botswana's digital innovation driver the Botswana Innovation Hub (BIH) was officially re-launched as the Botswana Digital and Innovation Hub (BD&IH) as the country intensifies efforts to embrace and leverage 4IR (Maramwidze, 2021). President Mokgweetsi Masisi confirmed in his recent State of the Nation Address that 4IR will be used in the country's digitisation strategy (Broadcast Media Africa, 2021).

COVID-19 has forced us to move quickly into the digital space. However, not all countries and people have the same capacity, usage and infrastructure to exploit 4IR technologies to fight Covid-19. The countries with high levels of capacity are doing well and those that lack this infrastructure are challenged. Despite this discrepancy, both Covid-19 and 4IR brought opportunities and challenges. The research in this area in Botswana is scarce. Recently, Muchuchuti, et al. (2021) carried out a study in Gaborone to investigate employees' level of awareness and preparedness for an era of full blown 4IR adoption. The study established 50% respondents confirmed their preparedness for the adoption of 4IR technologies; 65% were prepared to embrace and take advantage of the efficiencies brought about by 4IR. The study calls for the educators to consider aligning the curricular to the demands of the new era (Muchuchuti,

et al. (2021). In the above background, this study explored the students' perspectives on the opportunities and challenges in Institutions of Higher Learning in
Botswana.

2. PURPOSE AND OBJECTIVES OF THE PAPER:

The main purpose of the study was to explore student perspectives on opportunities and challenges of Covid 19 and 4IR on student learning. To accomplish the main purpose, the study pursued the following objectives:

- Investigate the 4IR technologies students use in online learning
- Determine the opportunities, offered by Covid 19 and 4IR technologies to learners
- Establish the challenges faced by learners in online learning in Botswana

3. LITERATURE REVIEW

Higher-educational institutions include not only universities and colleges but also various professional schools that provide preparation in such fields as law, theology, medicine, business, music, and art. Higher education also includes teacher-training schools, junior colleges, and institutes of technology (Encyclopedia Britannica, n.d.). In the context of this study Higher Educational Institutions are referred to Universities, colleges, professional schools and institutes of technology.

The term Fourth Industrial Revolution (4IR) was first coined in 2016 by Klaus Schwab, the Executive Chairman of the World Economic Forum, who had visualised 4^{th} Industrial revolution building on the third Industrial revolution that used electronics and information technology to automate production (Schwab, 2016). 4IR is characterized by the convergence and complementarity of emerging technology domains, including nanotechnology, biotechnology, new materials and advanced digital production (ADP) technologies. Its major attributes are: 3D printing, human-machine interfaces (HMIs) and artificial intelligence. (Lavopa and Delera, 2021). According to Ally and Wark (2020) the emerging 4IR Technologies are: robotics, 3D printing, Artificial Intelligence, Big data, Biotechnology, Blockchain, Cloud computing, Extended reality, Gamification, Internet of Things (IoTs), Interoperability, Learning factories,

Mobile devices/learning, Nanotechnology, Quantum computing, Smart factories, Smart sensors, Teaching factories.

3.1 Covid 19 and 4IR: The recent pandemic has been a catalyst for massive change in the manufacturing industry, unexpectedly accelerating companies into the 4IR. Due to quarantines, companies had to quickly adapt to switch to remote environment to ensure continuity and safety (Rubega, 2021). COVID-19 has presented an opportunity to embrace and adapt to new 4IR-based approaches and leapfrog current educational practices (Oke and Fernandes, 2020; Alakrash and Razak, 2022). The most profound change is the accelerated way in which digital transformation and the Fourth Industrial Revolution have moved at warp speed (Dwolatzky and Harris, 2020). Covid-19 accelerated the use of digital technologies and 4IR worldwide. For example, supported by 4IR technologies, online grocery shopping has become popular all over the world. These days, using an app on the cell phone, anyone can order groceries and restaurant food and get delivered to your doorstep in a few hours. One can even track the delivery person. Prior to Covid-19, this was mostly possible in developed countries. Accordingly, adoption of 4IR technologies has proven to be a matter of survival and on the other hand, Covid-19 has become an advocate of 4IR. COVID-19 accelerated the adoption of 4IR technologies, as people and companies are relying on cloud computing, artificial intelligence, the speed of 5G network, big data, and more (Marr, 2021).

3.2 4IR and Education 4.0

Education 4.0 is developed for Industry 4.0 and prepares qualified professionals for a global and digital working environment (Sharma, 2019), which refers to technology-based digitized teaching and learning using digital tools. “Education 4.0 is a response to the need for the Industrial Revolution 4.0, where humans and technology are converging to create new opportunities creatively and innovatively” (Lase (2019, p. 2). Its name originates from the fourth industrial revolution or Industry 4.0 in short (Bouronikos, 2021). Education 4.0 includes online assessments, robotics, Artificial Intelligence (AI), big data, Virtual Reality (VR), Augmented Reality (AR), and virtual environments. It is innovation-based education embracing 21st century learning skills (Fourtane, 2021 a). Education 4.0 shifts the major learning responsibility from the

instructors to the learners and the instructors' role is to facilitate the transition (Fourtane, 2021 a). Fisk (2017) characterises nine trends in Education 4.0. First, students have more opportunities to learn at different times in different places and E-Learning tools offer great opportunities for remote and self-paced learning. Second, learning can be personalized according to students' capabilities, third, students will be able to modify their learning process with tools they feel are necessary for them. Fourth, learning is more project-based; fifth, students are exposed to more hands-on learning through field experiences such as internships, and collaborative projects to obtain real-world skills. Sixthly, students are exposed to data interpretation and data becomes a fundamental new aspect of literacy. Seventh, different methods are used to assess students and the conventional platforms to assess through question and answer might become irrelevant, or insufficient. Eighth, the students are more involved in designing and updating the curriculum. Finally students are more independent learners and teachers assume a new role as mentors to guide the students through their learning process. In this paper the terms Education 4.0 and 4IR will be used interchangeably.

3.3 Education 4.0 technologies: The literature reveals the following major technologies used in Education 4.0:

Artificial Intelligence (AI): AI is defined as, "Theories and techniques developed to allow computer systems to perform tasks normally requiring human or biological intelligence" (JISC, 2021). In education 4.0 chatbots and digital assistants are mature applications of AI (JISC, 2021). Educational chatbots (ECs**)** are designed for pedagogical purposes and are viewed as an Internet of Things (IoT) interface that could revolutionize teaching and learning. They are used to provide personalized learning through a virtual assistant replicating humanized conversation. EC improve learning performance and teamwork, and facilitate collaboration among team members and increases the team ability (Kumar, 2021). Higher education is a relatively new industry to many emerging technologies. This is the case of Conversational Artificial Intelligence, also known as AI-powered chatbots. One of the best known chatbots employed in universities is IBM Watson for expediting student responses, downloading and providing documents, and answering subject-specific questions (Fourtané, 2021, a).

Mobile technologies: Mobile technologies such as, handheld and tablet computers, MP3 players, smart phones and mobile phones are playing an increasingly significant role in higher education. The proliferation of mobile technologies has led to game-based learning. Game elements into courses increase student engagement, foster collaboration, activates a competitive spirit and enhances their digital competencies (Grinshkun and Osipovskaya, 2020). Mobile technologies are used in education for immediate access to study materials, information, reading e-books, listening to podcasts, educational videos, educational games, accessing document libraries, participating in online lessons and tutorials, receiving live-streamed lectures, accessing video clips or audio libraries, reading asynchronous publications, participating in virtual learning communities, etc.

3D technologies: 3D technologies such as Augmented Reality, Virtual Reality and 3D printing enhance personalized learning by providing new ways of visualization, memorization and observation. 3D printing offers a faster and cheaper way to create objects (Kayembe and Nel, 2019). **Blockchain Technologies:** Blockchain enables researchers to publish their research outputs without restrictions, which allows them to monitor their research's reuse. Blockchain gives students ownership of their personal records, allowing them to control their academic identity (Maryville University, 2022). **Virtual Learning Environments (VLEs):** A VLE is a self-contained web-based system that integrates text, audio, video, and animation in multimedia environments. Course materials are posted and accessed by students online and various methods are used for student assessment (Alakrash, and Razak, 2022).

IoT Technologies: IoT devices could be anything ranging from biochips to mobile phones to sensors to a huge system all of them connected to each other. Through, IoT technologies, students can have reliable access to everything from learning materials to communication channels (Muskan, 2021). In education IoT applications are used in automated attendance recording, distance learning, enhanced interaction in smartphone-based virtual classes, augmented reality equipped systems (Muskan, 2021). Advanced IoT products and solutions have great potential benefits for the higher education, hence should be integrated into Science,

Technology, Engineering, and Mathematics core courses and vocational education and training (Grinshkun and Osipovskaya, 2020).

3.4 Opportunities of Covid 19 and Education 4.0

Covid 19 and Education 4.0 provides a number of opportunities including; establishment of e-resources, increased use of Social Media platforms, professional development through webinars and conferences free of charge, flexi working and study. The 4IR provides an opportunity to create an environment of creativity and innovation as established for South African education institutions (Penprase 2018). The 4IR provides an opportunity for education institutions "an opportunity for education institutions to foster partnerships with other stakeholders such as the government and private companies especially" (Kayembe and Nel, 2019, p. 91). Other opportunity is expanding access to education. Access to education is constrained in countries like South Africa because of resource limitations. Access to education can be expanded in technical and vocational, community and training colleges through online/blended learning (Mhlanga, 2021). Hayat, et al. (2021) identified the main opportunities from the COVID-19 pandemic for medical education as: positive attitudes to e-learning and adaptability, preventing students' separation from the educational environment, documentation and monitoring education, take control of own learning, and increasing perceived usefulness. Using technology, students can connect in a better way with many other stakeholders in the system, better communication with teachers, parents and management. Education 4.0 personalizes student learning and makes it more dynamic, accessible and fascinating (Sharma, 2019). Education 4.0 is "a more realistic and practical learning method, which can produce excellent results for student learning" (Sharma, 2019, p. 3560).

3.5 Challenges in online learning

There is empirical evidence of the challenges in online/remote teaching and learning. Investigating technology use in teaching during the COVID-19 lockdown in Malaysia, Alakrash and Razak (2021) identified numerous challenges faced by teachers: managing virtual classes, ensuring reliable Internet connections, a lack of preparedness, low digital competence, and dealing with students' mental health. Studying the opportunities and challenges of blended

learning in the education sector in South Africa post the COVID-19 disturbances, Mhlanga (2021) established the four challenges as: inequality because of skewed income distribution and unequal access to opportunities, digital divide, resource constraints and skills shortages. Oke and Fernandes (2020) found ubiquity of data connectivity, unreliable and expensive infrastructure as the challenges in online learning. Ramola (2021) ascertained: resistance in redesigning the course, inadequate online education infrastructure and conduct examinations as challenges. Hayat, et al. (2021) determined the main challenges from the COVID-19 pandemic for medical education in China as: noncompliance with virtual classroom etiquette, inadequate interactions, time limitations, and infrastructure defects and problems. Assessing the influence of the COVID-19 pandemic in motivating digital transformation in the education sector in Zimbabwe Chinengundu, Chakamba, and Hondonga (2022) found the challenges in remote learning as: lack of digital resources, access to household computers, and internet access, which impeded the new technologically based learning.

Table 1: A summary of empirical studies on education and 4IR

Author	Title	Geographic location	Method	Challenges
Alakrash, H. M. and Razak, N.A. (2022).	Education and the Fourth Industrial Revolution: Lessons from COVID-19.	Malaysia	Qualitative (Interview)	Challenges faced by teachers: managing virtual classes, ensuring reliable Internet connections, overcoming a lack of preparedness, low digital competence, and dealing with students' mental health.
Chinengundu, T; Chakamba, J; and Hondonga, J.(2022)	COVID-19 and the Digital Transformation of Education Lessons Learnt on 4IR in Zimbabwe.	Iran	Secondary sources	Lack of digital resources, access to household computers, and internet access, which impeded the new technologically based learning
Hayat, A.A.	Challenges and	China	Qualitative:	Noncompliance with

et al. (2021).	opportunities from the COVID-19 pandemic in medical education: a qualitative study.		Face-to-face and semi-structured interviews	virtual classroom etiquette, inadequate interactions, time limitations, and infrastructure defects and problems.
Mhlanga, D. (2021).	The Fourth Industrial Revolution and COVID-19 Pandemic in South Africa: The Opportunities and Challenges of Introducing Blended Learning in Education	South Africa	Desktop Research	Inequality, digital divide, resource constraints and skills shortages
Oke, A. and Fernandes, F. A. P. (2020).	Innovations in Teaching and Learning: Exploring the Perceptions of the Education Sector on the 4th Industrial Revolution (4IR)	South Africa	Qualitative (Interview)	Cost, ubiquity of data connectivity, slow, unreliable, extremely expensive infrastructure
Ramola, R.C. (2020).	Challenges and Opportunities for Higher Education amid COVID-19 Pandemic	India	Desktop Research	Resistance in redesigning the online courses, inadequate online education infrastructure and conducting online examinations

The above studies present the empirical evidence of several challenges faced in online method of teaching and learning, such as, a lack of access to remote learning, inadequate technological infrastructure, digital divide, insufficient digital literacy training, students' poor access to the internet because of poor network and low bandwidth.

4. METHODOLOGY

The data was collected through an online survey tool “Google forms”. The survey questionnaire comprised largely closed ended questions, while three questions were open-ended. Therefore, the

data collected was both quantitative and qualitative. Qualitative questions were added so as to provide opportunity for respondents to express their views and provide justification of some of the choices they made on closed ended questions. Thus, qualitative quotes were used to supplement quantitative data. Due to convenience and widespread of the targeted population (tertiary students), the survey link was distributed via email and WhatsApp so as to enable remote access. Accessibility of the link was only limited to individuals within the researchers' digital circles and/ online community (thus convenient sampling was used to access tertiary library users/students within the researchers' online connections). This survey also depended on snowball sampling (that is participants whom the link was directly sent to, they were asked to also share the link to their friends). The survey link was made open to tertiary students from 20th January to 5th February, 2022. Initially the link was distributed to fifty two (52) students in different institutions. However, due to snowballing technique a total of 120 responses were retrieved as shown on Figure 1. Quantitative data was analysed using Microsoft Excel while qualitative data was analysed manually. For anonymity purposes, qualitative responses were presented through alpha-numeric coding. The participants were represented by the systematic number given to each questionnaire (e.g., questionnaire 80). Thus, 'participant' was abbreviated as 'P' and the questionnaire number added to it (e.g., P80).

5. FINDINGS

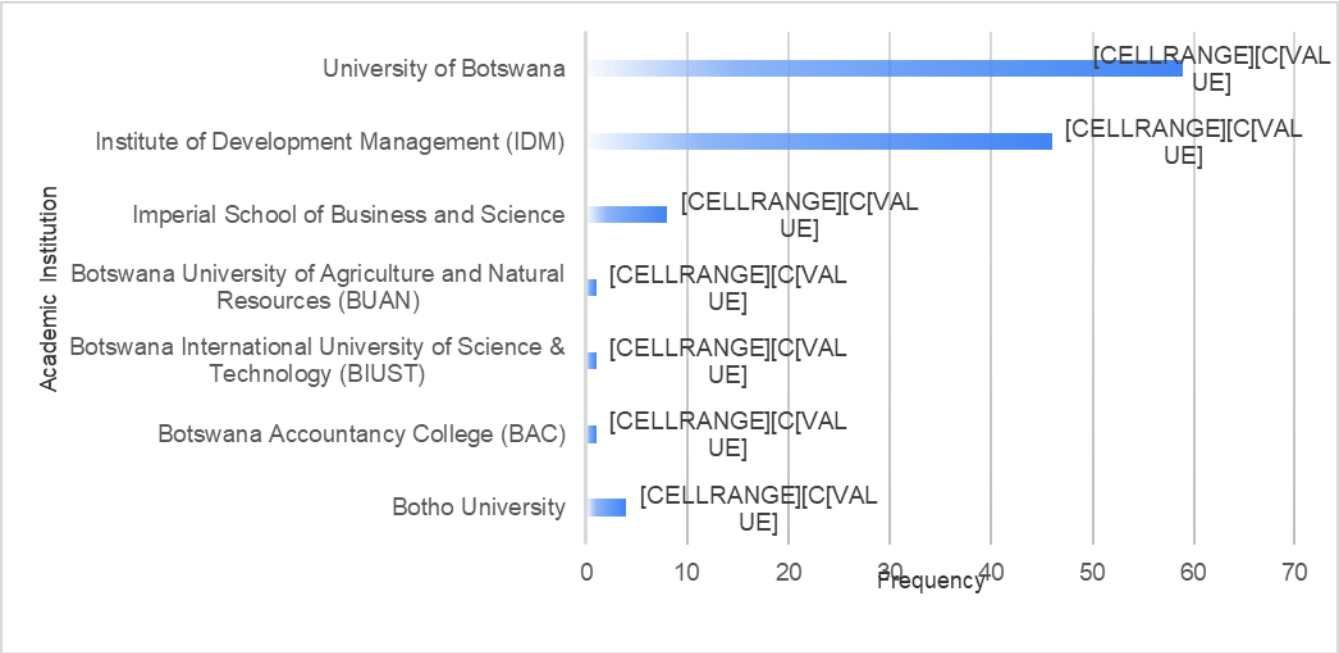
The findings of the study are presented in two parts: Part (A) Background Information and Part (B) Main findings.

Part A: Background Information

As shown on Figure 1, a total of 120 respondents studying at seven different Institutions of Higher Learning (IHLs) in Botswana participated in the survey. The majority (n=59, 49.2%) of the participants were from the University of Botswana, followed by Institute of Development Management (IDM) (n=46, 38.3%). Eight (n=8, 6.7%) respondents were from Imperial school of Business and Science, four (n=4, 3.3%) from Botho University, while one (0.8%) respondent each were from the following IHLs; Botswana International University of Science &

Technology ((BIUST), Botswana University of Agriculture and Natural Resources (BUAN) and Botswana Accountancy College (BAC).

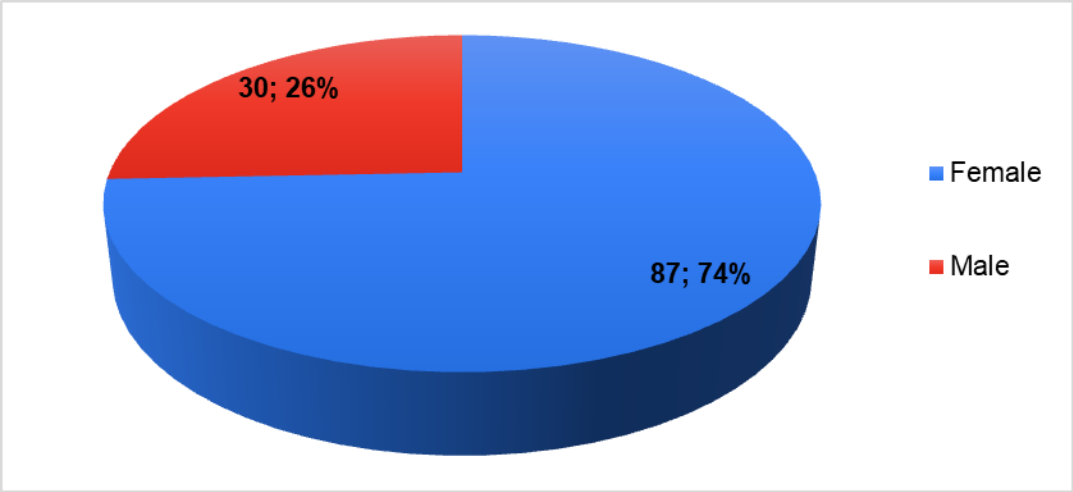
Figure 1: Participants Institution of Higher Learning (n=120)



Source: Field data, 2022

Gender: Of 120 participants, the majority of the participants were females (n=87, 74.4%) and 30 (25.6%) participants were males, while three did not respond to the question.

Figure 2: Participants Gender Distribution (n=117)



Source: Field data, 2022

As shown in Table (1), a majority (n=84, 76%) of the respondents were pursuing Bachelor's Degree, followed by those who were doing postgraduate degrees (n=20, 17%), diploma students (n=13, 10.9%) and one each from certificate and CIPS. Concerning level of study, most of the participants were in year 3 (n=42, 35.3%), followed by 35 (29.4%) participants in year 2, while 24 (20.2%) were in year 1 and 18 (15%) students were studying in year 4 and one of the participants did not respond.

Table 1: Students' Qualification and Level of study

Qualification	**Frequency**	**Percentage**
Bachelor's Degree	84	74.6%
Certificate	1	1%
CIPS	1	1%
Diploma	13	10.9%
Postgraduate	20	17%
Level of study		
Year 1	24	20.2%
Year 2	35	29.4%
Year 3	42	35.3%
Year 4	18	15.1%

Source: Field data, 2022

Part B: Main Finding

To assess the opportunities and challenges of Covid 19 and 4IR on student learning, the study pursued three objectives as follows:

Use of 4IR technologies in online learning: To address the first objective of the study, the students were asked to identify the technologies the participants use in online learning. The results are presented in Table 2:

Table 2: 4IR technologies used for online learning

Technologies	Frequency	Percentage
Moodle	78	65%
Microsoft Teams	57	47.5%
Social Media platforms (WhatApp, Facebook, Twitter, Instagram)	49	40.8%
Zoom	39	32.5%
BigBlueButton	37	30.8%
Google classroom	33	27.5%
Cloud computing	26	21.7%
Virtual libraries	17	14.2%
Mobile Technologies	17	14.2%
Blackboard	9	7.5%
Webskewl	8	9%
Skype	5	6%
White-board	3	3%
Google meet	2	1.7%
Digital pen	1	1%
Virtual laboratories	0	0%
Smart notebook	0	0%
3D technologies (Virtual Reality and 3D printing)	0	0%
Artificial intelligence (AI) (virtual mentoring, chatbots, Robotic tutor)	0	0%

Source: Field data, 2022

As it is apparent from Table (2), that the most commonly used online learning platform is Moodle (n=78, 65%), followed by Microsoft Team (n=57, 47.5%), Social Media (n=49, 40.8%), Zoom (n=39, 32.5%), BigBlueButton (n=37, 30.8%) and Google classroom (n=33, 27.5%). Other 4IR technologies attained very low responses; Cloud computing, Virtual libraries, Mobile technologies, Blackboard, Webskewl, Skype and White-board. The participants were further asked a follow-up question to briefly explain how they used the 4IR technologies for online learning and responses varied. For example, some respondents stated that:

"We use Google docs for group work, it allows every student to work remotely and we all can see instantly when other group members edit the document" said P3.

"Webskewl is used to download assignments, notes and slides. It is also used to submit assignments from home" P19 commented.

"We use ISBS e-library to access e-books and using ISBS Webskewl to access online study material like notes, slides, assignments and podcasts" P39 also observed.

"I use Microsoft Teams to attend tutorials and lectures and also for discussion purposes with classmates. Lastly, as a revision platform since lectures and tutorials are recorded" P41 further mentioned explained.

Opportunities, offered by Covid 19 and 4IR technologies to learners: The second objective sought to determine the opportunities offered by Covid 19 and 4IR technologies to learners. The responses are presented in Table 3.

Table 3: Opportunities, Offered by Covid 19 and 4IR Technologies (n=120)

	YES		NO	
Opportunity	**Count**	**Percentage**	**Count**	**Percentage**
Improved use and adaptability of e-leaning platforms	110	92%	3	3%
Build an education system for life-long learning	96	80%	8	7%
Flexibility in learning	96	80%	15	13%
Take control of own learning	91	76%	10	8%
Learning is more dynamic	91	76%	11	9%
Promotion of various 4IR technologies	87	73%	14	12%

Can connect and communicate better with teachers and other stakeholders in the system	86	72%	25	21%
Time-effective learning	84	70%	22	18%
Professional development through free webinars	73	61%	28	23%
Resolve issue of social exclusion	69	58%	38	32%
Cost-effective learning	65	54%	36	30%

Source: Field data, 2022

It is evidenced from Table 3 that the majority of respondents believed Covid 19 and 4IR technologies have offered numerous opportunities to learners. The main opportunities acknowledged were: improved use and adaptability of e-leaning platforms (n=110, 92%), building an education system for lifelong learning (n=96, 80%), flexibility in learning (n=96, 80%), taking control of own learning and dynamic learning (n=91, 76%), promotion of various 4IR technologies (n=87, 73%), possibility to connect and communicate better with teachers and other stakeholders in the system (n=86, 72%), professional development through free webinars (n=73, 61%), solution to social exclusion (n=69, 58%) and learning being and cost-effective (n=65, 54%).

Challenges faced by learners: Objective three sought to establish the challenges faced by learners in online learning in Botswana. The results are displayed in Table 4.

Table 4: Challenges Faced by Learners (n=120)

Challenges	**Frequency**	**Percentage**
Internet problem	76	84%
Financial constraints	40	44%
Low bandwidth	39	43%
Inadequate technological infrastructure	38	42%
Inadequate interactions	30	33%
Home environment not conducive for online activities	26	29%
Lack of technological skills	25	28%
Difficult to write online assessments/examination	21	23%
Resistance to change	21	23%
Challenges in access to digital Tools	19	21%
Technological trauma	19	21%

Noncompliance with virtual classroom etiquette	18	20%
Inadequate online education facilities	17	19%
Insufficient digital literacy training	16	18%
Digital Divide	13	14%
Lack of employee readiness	12	13%

Source: Field data, 2022

Table 4 indicates the major challenge as internet problem (n=76, 84%). Some of the challenges identified include; financial constraints (n=40¸44%), low bandwidth (n=39, 43%), inadequate technological infrastructure (n=38, 42%), inadequate interactions (n=30, 33%), unconducive home environment (n=26, 29%), lack of technological skills (n=25, 28%), difficulty in writing online assessments/examination (n=21, 23%), and resistance to change (n=21, 23%). Other identified challenges are, challenges in access to digital tools, technological trauma, noncompliance with virtual classroom etiquette, inadequate online education facilities, insufficient digital literacy training, digital divide, and lack of employee readiness. In order to have a better understanding of the challenges the respondents were further asked to elaborate the challenges they identified. Some of the comments and observations were as follows:

P98 stated that, "*internet connectivity is expensive and poor in most parts of the country, sometimes we miss classes due to poor network connectivity or students cannot afford to subscribe to internet. It is a serious problem especially for off campus and distance learning students".*
P45 also added that, *"lack of technological skills is the biggest challenge because it reduces the eagerness to attend classes or even interact with lecturers when assistance is needed. The internet issue is a struggle every academic year but we struggle through to the end".*

P19 commented that, *"noncompliance with virtual classroom etiquette is most common due to lack of proper learning space at homes and sometimes ending up being caught by chores".*

P41 also observed that, "*Most of the students including myself have technological trauma and lack of confidence in participating in the online lessons particularly in tutorials".*

P76 further noted that, *"Transitioning from physical to online learning was quite hard, there are also obstacles such as internet problems and insufficient digital literacy for both lectures and students. For instance, we could miss a lesson mainly because a lecture is unable to set up meetings through Microsoft teams. Moreover, it has led to inadequate interactions between the students and lecturers, students hardly engage".*

6. DISCUSSION

The study findings have revealed that institutions of higher learning in Botswana are lagging behind in the adoption of advanced 4IR tools that employ artificial intelligence (virtual mentoring, chatbots, Robotic tutor), blockchain, virtual laboratories, 3D technologies and IoT. This is evidenced by the high responses on the use of tools such as, Moodle being the most adopted; followed by the use of collaborative or meeting platforms such as, Zoom, Microsoft teams, BigBlueButton, Google classroom and social media platforms. On the other hand, tools such as, cloud computing, virtual libraries, mobile technologies, black board, Webskewl, Skype and white-board had insignificant responses. Virtual laboratories, smart notebook, 3D technologies, and artificial intelligence (virtual mentoring, chatbots, Robotic tutor) had no responses. However, the study participants elaborated on the use of applications, such as, Moodle, Zoom, Microsoft teams for remote learning. For example, Moodle and Blackboard are used by students for accessing class notes and assignments. The digital libraries are accessed through smartphones. Zoom and Microsoft Teams are used for interaction with classmates, and instructors. Cloud services such as, dropbox, google drive and one drive are used for storage of school projects and assignments. Participants further explained that they use social media platforms for group discussions, class announcements, course revision and quick notes exchange. It is praiseworthy that Institutes of Higher Learning in Botswana have put efforts in ensuring that teaching and learning continues through the digital platform even during the challenging times. However, it is important for institutions of higher learning to ensure that advanced 4IR technologies are available for students to use. .

Using Block chain students at Maryville University own their own personal records and are able to control their academic identity (Maryville University, 2022). Virtual labs bridge theory and practice by providing a multimedia connection between abstract concepts and practical execution. In a recent study about Loughborough University's web-based virtual learning platform, the students reported greater confidence in the understanding of theory in the virtual lab than the in-person lab and appreciated the ability to complete the virtual lab anytime, anywhere, for as long as they needed, and highlighted the benefits of the interactivity. Students, who completed some or all the virtual lab experiments, scored higher scores than those who did

not (83–89% vs. 67%) (Schnieder, Williams and Ghosh, 2022). Chatbots boost student wellbeing at University of Pretoria (UP), the top universities in Africa. The Student Counselling Unit (SCU) at UP built a first-of-its-kind SCU chatbot (SCU-B), known as 'Scooby'. Through this chatbot, students can express their needs, concerns, or questions using voice or text commands and SCU-B respond by suggesting self-help topics and resources (University of Pretoria, n.d.). AI systems have taken over human roles. For example, an "Intelligent Tutoring Systems" can gauge a student's learning style and pre-existing knowledge to deliver customized support and instruction (Lynch, 2017). A digital pen is an electronic ballpoint pen that digitizes, stores and allows users to capture handwritten notes to the computer. 3D-printing will prepare students for a workforce that demands sharp critical thinking and collaboration skills. In the U.S. alone, 3D-printing technologies could create three to five million jobs in the next ten years (Fourtané, 2021, b). Advanced IoT products and solutions provide numerous benefits for the higher education and IoT applications are used in distance learning and enhanced interaction in smartphone-based virtual classes (Muskan, 2021).

The study also revealed the major opportunities offered by Covid 19 and 4IR technologies as: improved use and adaptability of e-leaning platforms, building an education system for lifelong learning, flexibility in learning, taking control of own learning, online learning is more dynamic than the conventional learning and increased use of Social Media platforms. In the current study 110 participants felt that 4IR tools and Covid 19 provides learners an opportunity for improved use and adaptability of e-leaning platforms and 91 felt that it allows to take control of own learning. The findings are in line with Hayat, et al. (2021) findings, who had investigated the challenges and opportunities from the COVID-19 pandemic in medical education and identified the main opportunities as: positive attitudes to e-learning and adaptability, take control of own learning, and increasing perceived usefulness. In the current study 86 participants indicated that using 4IR tools learners can connect and communicate better with teachers and other stakeholders. This finding corroborates Sharma (2019) finding, who established using Education 4.0 technology students can connect and communicate better with their stakeholders. In the current study 91 participants agreed that using 4IR tools learners can take control of their own learning and online learning is more dynamic, which was again in line with Sharma (2019), who

averred that Education 4.0 personalizes student learning and makes it more dynamic, accessible and fascinating. This implies that despite the setbacks of Covid-19, it has also provided opportunities for IHL to undergo through digital transformation by utilizing the opportunities offered by the 4IR technologies.

The study uncovered the major challenges as: Internet problem, inadequate technological infrastructure, low bandwidth, and financial constraints. The Internet problem finding is in alignment with Alakrash and Razak (2021), Mhlanga (2021), and Chinengundu, Chakamba, and Hondonga (2022), who established internet connections, digital divide, resource constraints and skills shortages as some of the challenges in online learning. In addition, the study also corroborates with Oke and Fernandes (2020) and Hayat, et al. (2021), who found ubiquity of data connectivity, unreliable and expensive infrastructure and inadequate infrastructure as challenges in online learning. The findings of this study; inadequate technological infrastructure confirms the findings of Ramola (2021) and Chinengundu, Chakamba, and Hondonga (2022). The above challenges remain a concern especially for developing countries. Should these problems continue to be eminent in IHL, there is likelihood of the full capacity and benefits of the 4IR technologies not being realised.

7. CONCLUSION

This study was set to investigate the impact of Covid-19 and 4IR era on students' learning. The study pursued three objectives. Objective one was to find-out the 4IR technologies students use in online learning. The main virtual learning platform is Moodle followed by Microsoft Team, Social Media and Zoom. Other 4IR technologies are BigBlueButton, Google classroom, Cloud computing, Virtual libraries, Mobile technologies, Blackboard, Webskewl, Skype and White-board, which are used by the learners. Objective two was to ascertain the opportunities, offered by Covid 19 and 4IR technologies era to learners, the learners identified the main opportunities: improved use and adaptability of e-leaning platforms, building an education system for lifelong learning, flexibility in learning, taking control of own learning, and online learning was dynamic.

Objective three was to establish the challenges faced by learners in online learning in Botswana. The study identified Internet problem, inadequate technological infrastructure, low bandwidth, and, financial constraints as the major challenges. Based on the above main findings, it could be concluded that learners had positive attitude towards online learning and 4IR technologies.

8. RECOMMENDATIONS

Based on the findings of the study the following recommendations are proffered to improve online teaching and learning?

- **Investment in 4IR ICT technologies:** It is critical to invest in 4IR ICT infrastructure to promote online learning, develop high tech skills among students and survive and thrive in Covid era and similar situations. Institutes of Higher Learning and policymakers in Botswana should invest in adequate ICT infrastructure including advanced 4IR/education 4.0 technologies, high-speed Internet connection/bandwidth, high performance computing facilities and data services like other countries in the world to bring internet access and devices to every citizen.
- **Capacity building:** This study identified the skills gap as one of the challenges; it is recommended that the Institutions of Higher Learning should invest adequately in capacity building of the learners and educators.
- **Adequate budget:** The Institutions of Higher Learning should allocate appropriate budget for 4IR technologies to combat the problem of skills gap and poor ICT infrastructure.
- **Government support:** For Botswana to transition to knowledge-based economy, the Government of Botswana has a key role to play in the provision of adequate funding for adequate ICT infrastructure and high-speed Internet.
- **Create Awareness:** It is vital that the Institutions of Higher Learning create awareness of the benefits of 4IR technologies and Education 4.0 technologies among students.

Further study: This study was limited to assessing the impact of Covid-19 and 4IR from students' perspectives on the opportunities and challenges in the Institutions of Higher Learning in Botswana. There is a need for another study to examine the impact of Covid-19 and 4IR technologies from educators' perspective to have a comprehensive picture.

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EMBEDDED OPEN SCIENCE AS ROADMAP FOR SCIENCE, TECHNOLOGY, AND INNOVATION IN KNOWLEDGE-DRIVEN SOCIETY IN THE 4TH IR

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Abstract
Open Science (OS) is a movement that opens up new ways to make scientific research, data, and dissemination accessible to all levels of an inquisitive society across the globe. OS is a major step towards greater and better public use of information that research generates for knowledge building. The study is exploratory in nature as the study critically reviewed extant literature surrounding Open Science with a focus on science, technology, and innovation in 4IR, especially in the COVID-19 era. This study covered the OS concept and its emergence. Data sharing concepts were reviewed. Different open science schools of thought were explained. Moreover, the principles of OS towards research data sharing were highlighted. The study explored the objectives and characteristics of OS. The benefits of OS to knowledge management towards science, technology, and innovation were discussed. In addition, the paper established the relationship between Open Science and other concepts with the word openness. In addition, the key actors of OS were identified. Furthermore, the challenges of OS were underscored by knowledge management. It was concluded that OS as an umbrella term that encompasses norms of knowledge management with a great potential to flourish in a knowledge-driven society, especially in the COVID 19 era. Among the recommendations is the need for policy development and strategic planning within research institutions themselves to promote openness as a result of the adoption of OS. Also, the needs to develop an Open Science Framework (OSF) for managing the scientific workflow across the entirety of the scientific process.

Keywords: *Innovation, Knowledge Management, Open Science, Science, Technology,4IR, COVID*

INTRODUCTION

With the advance of technology and the evolution of the Internet, the activities in research have witnessed transformations in the various facets of research. These have brought various initiatives that promote digitization of information resources, collaboration, and sharing of research output and data. Among the initiatives are open science and open access. Open Science (OS) is the movement to make scientific research (including data, publications, physical samples, and software) and its dissemination accessible to all stakeholders in society at different levels, either unskillful or professional. Foster (2022), defined OS as the practice of science in such a way that others can collaborate and contribute, where research data, lab notes, and other research processes are freely available, under terms that enable reuse, redistribution, reproduction of the

research, and its underlying data and methods. OS could be defined as transparent and accessible knowledge shared and developed through collaborative networks. The Internet serves as a platform for OS likewise open access. With the immense role of the Internet in the achievement of OS initiatives, the supply of available data to researchers has continued to grow. According to McKiernan (2017), OS is called Open Scholarship in English, which represents a culture change in the way stakeholders in the research, education, and knowledge exchange communities create, store, share and deliver the outputs of their activities. Open science refers to all scientific culture that is described by its openness. It may often include features of open access, open data, and open source**.** According to García et al. (2010), open software owes its deepest roots to Open Access; Open Content are related to open access to the educative, cultural, or divulgated contents that are published under a non-restrictive license that allows copy and distribution, but also the right to modify works. This assertion established that OS has a strong relationship with other initiatives that promote openness. As supported by Mirowski (2018) that OS is passionate to Open Access to scientific content, while Open Innovation transfers the open access principles to creativity in production worldwide. The recent developments have shown a number of multi-stakeholder initiatives, which were funded to develop data-driven research platforms to enhance free access to research outputs and reduce the gap among researchers in their research findings. This creativity has led to data sharing, open access, and open science initiatives. One of the most significant and efficient ways for knowledge sharing is open science because knowledge is absolutely crucial for social evolution in a globalised world. Following United Nations Educational, Scientific and Cultural Oraganisation- UNESCO's principles, one of today's main goals is to build modern knowledge societies in which all stakeholders must be able to participate in information and knowledge sharing (Gracia & de Figuerola Jose, 2010). For universities and other stakeholders to embrace OS principles, policies, and practices, there is a need for cultural change in organisation, if this transition is to be successfully negotiated. This means a great opportunity for the scientific development and improvement of research outputs in all countries to enhance wide access and improve visibility of research findings using the Internet as a platform.

The Internet plays a clear and important role because it has fundamentally changed the practical and economic realities of distributing scientific knowledge. In modern scientific tradition, collaboration among scientists and the production of scientific public goods have been the engine for scientific production and the justification for public investment in science (David, 2009). Scientists have been expected to collaborate across disciplines and over generations so as to contribute to a stock of interconnected knowledge needed for scientific advance and for a knowledge-driven society. This interconnected knowledge must be managed with the word openness as the watchword.

The point of departure between Open Science (OS) and Knowledge Management (KM) is that OS is more universal and expansive while KM is organization-based and narrowed. It is established that OS provides opportunities for KM to break free of its cocoon status. The strides that open access has made, provide opportunities to make a mark in the sand for the collaboration between OS and KM. This 'de-cocooning' of information and knowledge will add significant propulsion to the growth of knowledge societies and equally add impetus to the growth of the global knowledge economy. This is evidenced by Guédon et al. (2019) that open science is a somewhat wider term and is about maximising the dissemination of knowledge and enabling collaboration by professional researchers and the interested public.

The involvement of OS and KM will lead down the road to a knowledge economy and an informed society which in itsself leads down the road to the development of science, technology, and innovation. Science is the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment. Similarly, science could be seen as the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence. The outcome of scientific research is expected to promote technology development by adopting the principle of openness which is the cardinal point of the Open Science Initiative. The technology could be described as the application of scientific knowledge for practical purposes, especially in the industry for machinery and equipment development.

Technology is the sum of many techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation (Obodo, 2021). The technology must embrace the principle of openness that will aid collaboration and sharing of knowledge among stakeholders for the purpose of innovation. Innovation plays an essential role in the unending success of any organisation. The end result of any innovation is the product or method or new idea that would contribute immensely to knowledge that would be beneficial to society at large. Scientific knowledge plays an essential role in the discovery of the COVID 19 vaccine and the evolution of the 4IR in our society today. The widespread implementation of Open Science principles increases the rigour, reliability, and reproducibility of scientific results (Besançon et al., 2021) could help optimize research efficiency moving forward, and thus improve health outcomes and economic costs related to COVID-19.

Innovation is germane in any knowledge-driven society because, it gives companies an edge in penetrating markets faster and provides a better connection to developing markets, which can lead to bigger opportunities by adopting the Open Science principle. The 4IR represents a new era of innovation in technology. The 4IR is meant to unlock new market opportunities and fuel growth across the globe (Ramakrishna et al., 2020). This can be facilitated by the principle of OS so that knowledge gained could be widely distributed for the drive of knowledge sharing, use and reuse by the generality of the society.

The 4IR is a term coined by Klaus Schwab in 2016. The 4IR is largely driven by four specific technological developments: high-speed mobile Internet, Artificial Intelligent (AI), automation, the use of big data analytics, and cloud technology (Ndung'u, & Signé, 2020). The impact of 4IR cut across all sectors to increase human productivity, especially in a knowledge-driven society that adopted the OS initiative which serves as a roadmap that connects science, technology, and innovation especially in the Coronavirus era tagged COVID -19.

Coronavirus Disease (COVID-19) is a pandemic disease that emerged and it was caused by the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID was first identified in December 2019 in Wuhan, China. The name was chosen to avoid stigmatizing the virus's origins in terms of populations, geography, or animal associations (WHO, 2020; The New York Times, 2020). The entire world must continue to embrace the Open Science initiative in their struggle to proffer solutions to the pandemic diseases by sharing information and encouraging collaborations among the stakeholders. Irrespective of the philosophical underpinnings of Open Science, the ultimate goal is to share information, data, and knowledge for a better society. Therefore, the study examined Open Science as a roadmap for science, technology, and innovation in a knowledge-driven society in the 4th IR.

Data Sharing

All over the world, there are demands for data sharing for the benefit of all stakeholders. The emergence of wide distributed networks, cross-platform interoperability, intranets, E-Government online services, and standardization of IP protocols has all enhanced data and information sharing (Yego, 2014). Information could be described as sharable things which can be exchanged, even after you give it away or sell it, you still possess it. The combination of the two terms "data and sharing" needs to be understood before any further discussion. Data is an umbrella term that covers a wide range of meanings and is thus difficult to define (Borgman, 201: 2015). Several studies have failed to provide any widely accepted definition of data or data sharing but provided a definition based on researchers' perspectives. Many studies (Enke et al., 2012; Pepe, Goodman, Muench, Crosas, & Erdmann, 2014) defined data sharing as a means of making data available to others. This definition is just a paraphrase and is not adequately detailed to cover the multiplicity of data and data-sharing practices. From the perspective of the researcher in the present study, data could be defined as actual records such as textual records, numerical scores, sounds, and images. This suggests that data could be facts, information used to calculate, analyse, or plan something. Researchers agreed that a universal definition of data is a difficult craft. According to Elsevier (2018) what is meant by data and the level of importance assigned to such data differs in various contexts and disciplines. Borgman (2015: 29) defined "data as entities used as evidence of phenomena for the purposes of research or scholarship". Also, Martone et al. (2018)

defined data as the measurements, observations or facts taken or assembled for analysis as part of a study and upon which the results and conclusions of the study are based. The usefulness of data hinges on the dissemination of data to the users by embracing the Open Science principle of openness. For the sharing concept, it is the act of distribution thus, sharing of data is the allotment of data between or among people of like minds for the purpose of effective utilisation. Furthermore, Martone et al. (2018) opined that data sharing is the publication of primary data and any supporting materials required to interpret the data acquired as part of a research study. Thus, data sharing could be described as a means by which a researcher consents one or more other individuals to use data, with mutual understanding, if not explicit assumption that it is on a reciprocal basis. Borghi and Van Gulick (2018) defined sharing to include "activities involving the dissemination of conclusions drawn from neuroimaging data as well as the sharing of the underlying data itself through a general or discipline-specific repository" (p. 10). There are many types of data sharing: Data shared by individuals, data shared by institutions, information shared between firmware/software (Such as the Internet Protocol (IP) addresses of available network nodes or the availability of disk space for modern technologies such as cloud computing) but all embraced the word "openness" as a cardinal point of Open Science schools of thought.

The Schools of Thought for Open Science

Open Science is an umbrella term that encompasses a multitude of assumptions about the future of knowledge creation and dissemination. Fecher and Friesike (2014) identified five (5) Open Science schools of thought:

1. The infrastructure school: This is concerned with the technological architecture;
2. The public school: This is concerned with the accessibility of knowledge creation;
3. The measurement school: This is concerned with alternative impact measurement;
4. The democratic school: This has to do with the promotion of equal access to knowledge either created or shared knowledge. Thus, access to knowledge is germane.
5. The pragmatic school: The pragmatic belief that knowledge created through joint efforts or a collaboration approach must be shared among peers. Hence, it is concerned with the promotion of collaborative research.

The advocates of pragmatic schools regard Open Science as a method to make research and knowledge dissemination more efficient (Fecher & Friesike, 2014). As alluded by Van der Zee and Reich (2018) Open Science makes research outputs accessible without financial, legal, and technical barriers. Open Science promotes the rights of all people because scientific results have "a powerful effect on people's capacity to speak up as active citizens on matters that are shaping their city and their world" (Suppli et al., 2013: 281). There is a need to trace the development of Open Science for a better understanding of the principle behind Open Science.

The Emergence of Open Science

Economists consider scientific knowledge generated by public research as a public good, which means that everyone can make use of that knowledge at no additional cost once it is made public, generating higher social returns. This thinking is not altogether new. As far back as 1942**,** Robert King Merton, an American sociologist of science, described a set of ideas that characterised modern science and to which scientists are bound. First and foremost is the notion of common ownership of scientific discoveries, according to which the substantive findings of science are seen as a product of social collaboration and are assigned to the community. Scientists' claims to intellectual property are limited to recognition and esteem. The race to be the first to claim recognition – the so-called priority rule – in science has traditionally been a strong incentive for scientists to make their knowledge public. The term "open science" was coined by economist Paul David (2003) in an attempt to describe the properties of scientific goods generated by the public sector and in opposition to the perceived extension of intellectual property rights into the area of information goods Open Science is a combination of objective and subjective goals to improve research and science in general.

David underlines that Open Science is "a fragile cultural legacy of Western Europe's history" (David, 2004: 571) when he analyses the history of Open Science back to its appearance during the late sixteenth and early seventeenth centuries and the court patronage system of the late Renaissance Europe (David, 2007). In the 17th Century, the shift toward Open Science was visible in public life and the first science periodicals were published (Willingsky, 2005). The first science association was established and tagged the Royal Society of London for Improving

Natural Knowledge and founded in 1660 with a strong focus on "openness" and including women indicating this shift, too (Willinsky, 2005). The basis for this appearance of Open Science was a change in the opportunities, needs, and demands of western European feudalism and the fragmented and competing noble patrons (Stracke, 2020). In the modern science of the 20th Century, Open Science is closely connected with the emergence of open source and open access according to Willinsky (2005).

Today, open education can be seen as an umbrella concept covering a number of projects revolving around "openness" in the digital world, such as Open Educational Resources, open-source, open access, Open Science, open archiving, and open publishing (Peters, 2008; Peter & Deimann, 2013). Open Science is based on the principles of inclusion, fairness, equity, and sharing, and ultimately seeks to change the way research is done, who is involved, and how it is valued.

The Principles of Open Science

The principles of openness to the whole cycle of scientific research include the following:

1. Quality and integrity: Academic freedom, human rights, and support for high-quality research should be given priority by open science. This can be achieved by bringing together multiple sources of knowledge and making research both methods and outputs widely available for rigorous review and scrutiny, and peer-review with transparent evaluation processes (Gong, 2022).
2. Equity and fairness: Open science is expected to play a key role in ensuring equity among researchers from developed and developing countries (Tennant et al., 2016). Also, it's enabling fair and reciprocal sharing of scientific inputs and outputs. In addition, provision of equal access to scientific knowledge for both producers and consumers of knowledge regardless of geographical location, nationality, age, gender, race, income, socio-economic circumstances, career stage, language, religion, discipline, disability, ethnicity or migratory status, or any other grounds.
3. Collective benefit: Open science promotes openness, thus, belongs to humanity in common and benefits humanity as a whole, especially in global public goods (Cribb &

Sari, 2010). This suggests that scientific knowledge should be openly available and the benefit should be universally shared. The practice of science should be inclusive, sustainable, and equitable, also in opportunities for scientific education and capacity development (UNESCO, 2021)

4. Diversity and inclusiveness: Open science should adopt a diversity of knowledge, practices, workflows, languages, research outputs, and research topics that support the needs of the scientific community and other stakeholders.

In addition to open science core values and principles, there are two broad objectives with many characteristics as enumerated:

The Objectives and Characteristics of Open Science

Open Science (OS) promotes the word "openness. OS is a combination of subjective and objective goals that enhances science in diverse subjects and disciplines as a whole. There are two prime objectives of Open Science as shown in Figure 1, the first objective is the reliability of the research findings while the second objective is trust in scientific research. According to Cook, Lloyd, Mellor, Nosek, and Therrien (2018) and Higgins (2016) both objectives (reliability and trust) have the intention to overcome the fake news from the post-truth age. The two objectives assist each other by complementing and directly interrelated.

Furthermore, reliability provides objective credibility as a result of formal correctness and reproducibility. Similarly, trust leads to subjective credibility due to individual confidence building as shown in Figure 1.

The two main objectives open the door to the features of Open Science. Thus the two main characteristics of OS are transparency and openness. For any research to contribute immensely to science, technology, and innovation, the whole research process from the design to the critical review after publication must be transparent and open (Miguel et al., 2014; Banks et al., 2019). Thus the following features explained better the unique characteristic of open science

1. **Transparency**: This is one of the features that promote openness of the Open Science. As reiterated by Cook et al. (2018) that transparency is a core value of science for credibility purposes. Also, it is required to maximize insights, peer evaluation, and evidence.

2. **Openness**: Also, sincerity is germane as a feature of Open Science. This assertion supported Molloy (2011) who opined that openness has become an umbrella word that includes the sharing of research materials and data to promote better understanding, verification, improvement, and re-usage (Miguel et al., 2014)

3. **Reproducibility**: This is another characteristic of Open Science and it is the ability of the research to be reproduced. As established by Nosek and Errington (2017) that reproducibility indicates how robust and repeatable research findings are and it includes the potential replicability (Goodman, Fanelli & Ioannidis, 2016). In addition, reproducibility addresses the influence of decisions during the data analysis (e.g., on outliers and covariates) for consistent findings by different researchers, too (LeBel, McCarthy, Earp, Elson & Vanpaemel, 2018; Spellman, 2017).

4. Trustworthiness: It means to which extent research methods and data and the resulting findings can be called reliable and valid representations of reality. This is another feature of OS. There is a core argument in favour of Open Science that enhances the trustworthiness of the research findings. Trustworthiness has a strong relationship with the first objective of Open Science (i.e., higher reliability and validity).

Overall, the research evidence from Open Science is considered more reliable and valid due to its increase in transparency, openness, and reproducibility (Cook et al., 2018; Nosek et al., 2015). Moreover, in the long-term view, trustworthiness should support the second objective of Open Science (i.e., greater trust and confidence in research) by convincing both, the researchers, as well as the citizens and the whole society. From the features of OS, it plays an essential role in overcoming fake news and in building a societal consensus and knowledge community.

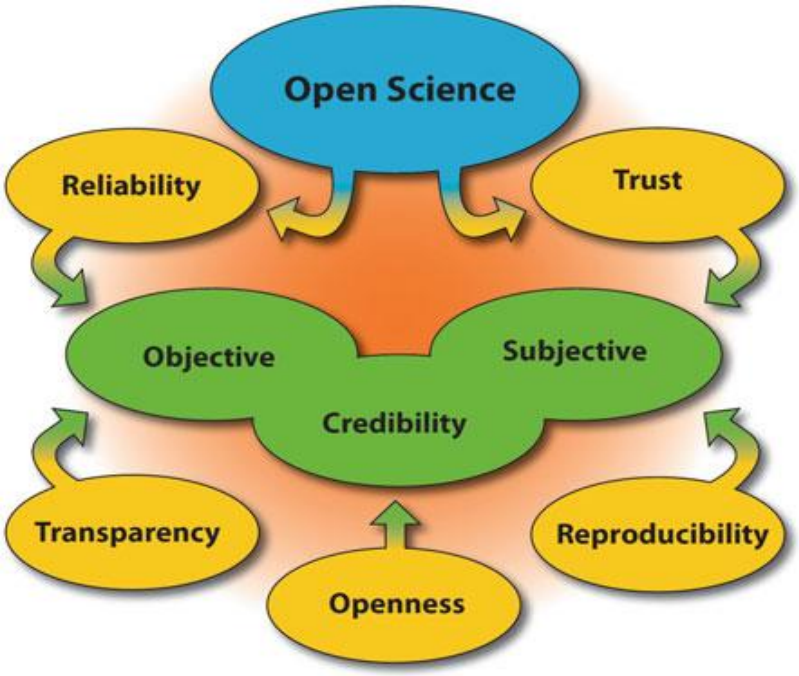


Figure1: The two main objectives- Reliability and Trust of Open Science (Stracke, 2020)

Benefits of Open Science to Science, Technology and Innovation.

The future of Open Science depends on the problems and needs of researchers that can identify and solve the issue. Therefore, the benefits of Open Science focus on its support for the individual researchers and the whole science and technology and community to yield innovation for a knowledge-driven society, especially in COVID -19 era. Open Science has enormous benefits such as:

1. **Improving scientific efficiency:** OS practice would increase efficiency as evidenced by Zuo et al. (2014). To increase efficiency in scientific production means to be able to achieve more or better scientific outputs (i.e. findings, publications, trained scientists) using the same amount of scientific inputs (i.e. resources). This relates to costs advantages or to learning advantages of openness and collaboration. In turn, we may refer also to dynamic efficiency when there is an increase in the likelihood of improving efficiency in the future given the current state of the art. In turn, collaboration and interaction with the community improve efficiency also by boosting creativity. Open science practices sometimes involve communities participating in analytical or design research stages (not just data collection). In

those cases, non-academic actors or scientists from different disciplines could contribute by sharing knowledge through collaborative efforts that lead to a knowledge-driven society

2. **Transparency and facilitating networking for collaborative efforts**. Open science removes geographical barriers for any potential authors to have adequate access. Also, OS shifts research from the "publish or perish" mantra to a knowledge-sharing ideal because knowledge is freely accessible (Faciolince & Green, 2021).
3. **Improving democratisation of scientific knowledge**: The democratization of scientific knowledge could be achieved through the three complementary mechanisms through which open science practices (Arza & Fressoli, 2017). By improving access to scientific resources; enabling the participation of a wider community in the research process; and making science better understandable for a wider population. Open access increases the pool of information available to anyone in a knowledge-driven society, not just scientists. Nurses, patients, teachers, students may get too interested to learn about the latest
4. **Enhancing research capacity that meets societal needs**: There are three approaches reflected in the literature on how open science practices improve the research capacity to solve societal needs and bring improvement in science, technology, and innovation (Price-Whelan, et al., 2018). The wider access promotes the visibility of the research findings. Secondly, by promoting community actors to participate in the scientific work the research agenda could be better guided towards solving problems affecting that group. When the community is engaged in research people will have the opportunity to grab from their own informed experience and offer inputs for developing solutions that will enhance a knowledge-driven society. Also, the open availability of scientific resources deters private appropriation of such resources. This might lead to finding cheaper solutions to societal problems.
5. **Open Science as an actor for innovation and growth**: It guarantees open access to publicly-funded research outputs and the possibility of the novelty of knowledge sharing by providing infrastructures. OS enhances access to research data and encourages its re-use outside academia. For example, companies particularly small and medium-sized enterprises (SMEs), can access and re-use data, infrastructures, and tools easily and at a reasonable cost,

thus accelerating the implementation of new ideas for innovative products and services (Väänänen, & Peltonen, 2016).

Openness is an essential ingredient in Open Science and other initiatives which are needed in order to capitalize on the results of research and innovation. This shows that there is a strong relationship between Open Science and other initiatives that promote accessibility and visibility of research outputs.

RELATIONSHIP BETWEEN OPEN SCIENCE AND OTHER CONCEPTS WITH THE WORD "OPENNESS"

Open science is the umbrella term for the movement to make scientific research, data, and dissemination accessible to all levels of an inquiring society. Open science encompasses practices such as publishing open research and campaigning for open access, which is generally perceived to make it easier to publish and communicate scientific knowledge. Thus, open science acts as an originator to knowledge management which involves the collection of methods relating to creating, sharing, using, and managing knowledge.

The four (4) core concepts, which are open science, knowledge management, open access, and knowledge economies could be pulled together in identifying the benefits of their collusion for a knowledge-driven society. Open knowledge comprises Open software, Open content, Open Science, and open innovation. Open Science is devoted to the open access to scientific content, while Open Innovation transfers the Open Access principles to the enterprise production world, which is actually vital for the enhancement of organisations. Open Software owes its deepest roots to Open Access; Open Contents are related to open access to the educative, cultural, or divulgated contents that are published under a non-restrictive license that allows copy and distribution, also the right to modify works. Open data is the idea that researchers and practitioners such as governments and other institutions embraced. They should not only publish their findings in the form of articles or reports but also share the corresponding raw data sets among the key actors of Open Science.

KEY ACTORS IN OPEN SCIENCE

There are three major actors such as libraries, repositories, and data centres. In addition, other actors in Open Science are researchers, government ministries, funding agencies, universities, and public research institutes. Also, as private non-profit organisations and foundations, private scientific publishers, businesses, and supra-national entities (OECD, 2015). Despite the huge benefits of Open Science that spread across to all stakeholders, however, there are challenges facing OS.

CHALLENGES FACING OPEN SCIENCE INITIATIVE

The challenges facing African countries are enormous such as drought, poverty, and youth unemployment that result from the combination of a population explosion and weak economic growth. It has been argued that the capacity to exploit these opportunities would be greatly enhanced by a strong, multi-state open science system that could drive innovation and development on the continent (Mwelwa et al., 2020). Africa is poorly equipped to benefit from the so-called 4th Industrial Revolution (4th IR) because of generally weak scientific systems that operate in isolation and, with some notable exceptions, fail to create the collaborations that could create economies of scale and generate impact in communities across Africa.

Adoption of the open science movement could be a powerful means of providing evidence-based solutions to put Africa on a path to sustainable development as advocated in the United Nations Sustainable Development Goals and the African Union's Agenda 2063 (Mwelwa, 2020). However, many researchers only support Open Science in theory, and the individual is confronted with various difficulties when putting open science into practice. There are challenges facing Open Science despite its huge benefits. The following are the limitations:

1. **Lack of Political Will**: There is a clear need for political determination to promote Open Science (OS) and integrate it into the government agendas. New policies need to be formulated and developed into clear strategies. Also, the necessary resources need to be allocated in order for these policies to succeed. Hence, there is a need for policy development and strategic planning within research institutions themselves to promote openness as a result of the adoption of OS. In Africa, countries were at various levels of development in OS that are yet to be completed. This might be due to a lack of political commitment in government.

2. **Issue of Trust:** Most researchers and innovators have insufficient trust in the open science approach, particularly with regard to the ownership of results. Also, the intellectual property that might arise from technological developments may discourage the right owner of the knowledge and the importance of publications and prime authorship. In addition, issues that are regarded as important for career progression could not be taken for granted.
3. **Technological**: While there is a tremendous improvement in Information and Communication Technologies (ICTs) and most of the e-infrastructures have grown both in quality and quantity, yet, there is still a wide range of aspects to improve in order to support and ease researchers' workflows to transit to a culture of openness. As reported by Gagliardi, Cox, and Li. (2015) that there is a lack of adequate human and infrastructural capacity in ICT to handle the complexity of open science and the institutionalisation of open science.
4. **Inadequate research databases and journals**: There is no dedicated journal and database for Open Science. This is necessary to motivate researchers to adopt the Open Science initiative.
5. **Financial support:** The main objective of Open Science is to enhance openness which will lead to the higher efficiency of research. Moreover, it will equally yield a better use of resources and foster spillovers in the scientific and innovation systems, significant investments have to be made at the beginning in order to develop the technical, political and, organisational ecosystem of Open Science.
6. **Demand for high impact journals: T**he demand by funders, universities, and research institutions for researchers to publish their results in "high impact journals", which are rarely open-access journals, create more problems to open science in Africa, where access to published scientific works, let alone access to the internet, are inhibited by prohibitive costs.
7. **Organisational Readiness**: For research usually takes place within an institutional framework, the organisation itself has to be ready to smooth the transition towards an open research culture, suiting its units, services, and human resources to accommodate an Open Science workflow, thus, developing or acquiring the appropriate skills.

8. **Socio-cultural:** This factor is peculiar to researchers and is related to inadequate awareness of the benefits and importance of opening up their research. Also, the reluctance to change their current workflows and practices regarding the sharing of data along the research process; researchers consider it a time and effort-consuming activity (Palaiologk et al., 2012). Adding to their existing workloads; are the diverse approaches that may have researchers from different disciplines or at different stages in their careers; In addition, lack of clear recognition and a reward system that promotes Open Science practices.

Challenges are meant to be resolved for the benefits derived from open science by the stakeholders. This will facilitate knowledge management towards innovation for the improvement of science and technology.

KNOWLEDGE MANAGEMENT

Knowledge management could be defined as the process of creating, storing, sharing, applying, and re-using organizational knowledge to enable an organization to achieve its goals and objectives. (Tang &Wong, 2015). Knowledge management is an interdisciplinary process of creating, using, sharing, and maintaining an organization's information which requires the adoption of open science for effective management. This will facilitate knowledge sharing that can be manipulated to create an opening for collaboration between open science and knowledge management. Knowledge management is extending the concept of "knowledge" beyond existing concepts like "memory", "storage", and "information". This working definition will be interrogated to identify synergies with open science. The ultimate purpose is to find synergies that will ease the free flow of information for the global growth economy in a knowledge-driven society.

Knowledge management is widely viewed as a range of strategies and practices that are used in an organization to identify, create, preserve and distribute insights and experiences. These insights and experiences are converted into information and knowledge and are very often an important component of an organisation’s business strategy. The key principle is sharing of information and knowledge with openness as a watchword.

CONCLUSION

The study used an exploratory approach and reviewed extant literature surrounding Open Science with a focus on science, technology, and innovation in 4IR, especially in the COVID-19 era. Science is the mother of the digital age. The evolution of science into a more open and data-driven enterprise is often referred to as Open Science which crucial for science, technology, and innovation. Open Science as an essential concept has a global capacity to address many of the fundamental issues that human society will continue to face. The World Wide Web software placed in the public domain has created an effective open Internet but science itself has struggled not only to "go digital" but also to "go open". This is a promise of making Open Science a reality by making the results of publicly funded research, namely scientific publications and research data openly accessible to researchers and innovators in a digital format for a knowledge-driven society, especially in the COVID-19 era. These efforts by researchers, research funding agencies, governments, and the scientific community itself promote an embedded open science as a roadmap for Science, Technology, and Innovation (STI) in a knowledge-driven Society in the 4^{th} IR. These efforts are in the interest of enhancing transparency and collaboration and fostering innovation for a knowledge-driven society, especially in the pandemic period. The Open Science initiative will continue to be the catalyst that liberates the world from COVID-19 and that linger steady growth in facets of science, technology, and innovation for the sake of knowledge sharing in our society with the aid of a supportive model marked 4IR. Thus, the total adoption and use of embedded open science will serve as tools of the digital revolution to enhance the 4IR in areas of collaboration and sharing of research outputs for institutional and national research systems. It can be concluded that the study established the essential role of open science to knowledge-driven toward science, technology and innovation in the Fourth Industrial Revolution.

RECOMMENDATIONS

Based on the available literature to the researcher, the following suggestions were made:

1. Developing Open Science Framework (OSF) is necessary for the effective adoption of Open Science in any research activities. This is an infrastructure for managing the

scientific workflow across the entirety of the scientific process, and it enables openness in an all-inclusive manner. The scientists' workflow is the process by which scientists derive success under any incentive structure while the workflow is the level at which implemented solutions precisely, those that enable openness can be incentivized.

2. There is a need for policy development and strategic planning within research institutions themselves. This will promote openness with the effective adoption of Open Science.
3. Open Science should accommodate indigenous knowledge systems communicated in multilingual formats to expand and guarantee access to millions of researchers who are likely to achieve the potential scientific knowledge for creativity and innovation for development.

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WHAT TRIGGERS THE BEHAVIOUR OF MILLENNIALS TOWARDS THE ADOPTION OF THE COVID ALERT APPLICATION? EVIDENCE FROM SOUTH AFRICA

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Abstract
The study aims to investigate the factors that trigger the behaviour of millennials towards adopting the COVID Alert application (app) in an emerging economy of South Africa. The study was grounded in the UTAUT by exploring the linkage between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude and behavioural intention. A quantitative descriptive design was followed, and a self-administered questionnaire was used to collect the primary data for the study. A structural equation modelling technique was used to validate the significance of the hypothesised relationships between the constructs in the proposed conceptual model. The findings revealed that performance expectancy, effort expectancy, social influence, and facilitating conditions have a positive influence on attitude towards accepting the COVID Alert app. In addition, attitude was reported to have a direct effect on the level of behavioural intention. It is, therefore, important for health practitioners and policy-makers to cultivate the adoption behaviours of millennials towards the COVID Alert app, thereby contributing to the development of strategies for curbing the spread of the corona virus and future disease outbreaks.

INTRODUCTION

The world has recently been hit by a new pandemic known as SARS-CoV-2 (the novel corona virus or COVID-19 for short), which has led to decreased economic activity, a public health crisis, and the loss of lives in many households (WHO, 2022). For this reason, COVID-19 has infected over 360 million people worldwide and contributed to more than 5.6 million deaths (WHO, 2022). A report by Statista (2021) suggests that COVID-19 has weakened the global economy as evidenced by a 6.7% decline in gross domestic product (GDP) and over 200 million job losses. As a result, COVID-19 has spread to more than 190 countries, including South Africa, resulting in a 7% decline in GDP, shrinking exports (down by 5.9%), and an increased unemployment level (34.9%) (Stats SA, 2021; World Bank, 2021). Moreover, COVID-19 continues to spread across South Africa: more than 3.5 million positive cases and over 94,000 deaths have been reported (SA Coronavirus, 2022). With this in mind, South Africa and other countries alike, have been forced to implement effective control measures (e.g., contact tracing,

wearing of masks, social distancing, etc.) in an effort to safeguard the lives of their citizens and to reduce the spread of the coronavirus (WHO, 2022). A possible approach for addressing this challenge, is through the use of the COVID Alert application (app) (SA Coronavirus, 2022).

According to SA Coronavirus (2022), the COVID Alert app is a contact tracing tool that harnesses bluetooth technology to identify and monitor individuals who have been exposed to the coronavirus to ensure rapid isolation, thereby reducing its spread. The purpose of the COVID Alert app is to notify individuals who have been exposed to positive cases by detecting their contacts between various mobile devices and automatically sending them notifications about their potential exposure to the coronavirus (SA Coronavirus, 2022). Notably, the success of any contact tracing app depends largely on the number of users that adopt it (WHO, 2021). The greater the number of users, the more effective the app becomes in slowing down the rate of infections (Ross, 2021). An effective way to achieve this is to increase the adoption of the COVID Alert app among the different generational cohorts (WHO, 2021). According to Euromonitor (2021), the millennial generation is more tech savvy: they embrace digital technologies and so present an attractive market (3.5 billion) for the adoption of contact tracing apps. In addition, millennials have a high degree of downloading apps through their smart phone and their choice to download a particular app is influenced by the opinions of friends and families (Leon, 2018). They download these apps for multiple uses such as: to enrich their in-home experiences, conduct online shopping, and enhance their physical and mental health (Dilotsotlhe, 2021). In the same vein, Euromonitor (2021) discovered that millennials use apps to maintain a healthy lifestyle, and they prefer to receive information about their well-being via their app. Therefore, millennials present an opportunity for the wider acceptance of the COVID Alert app, as they are highly receptive to digital innovations and enjoy engaging with brands in an online environment (Euromonitor, 2021).

Although, the COVID Alert app is an important tool that aids in curbing the spread of the coronavirus, research has not investigated its adoption among the millennial cohort. The existing literature (Alsaad & Al-Okaily, 2021; Duan & Deng, 2021; Hauff & Nilsson, 2021; Nguyen, Nguyen & Tran, 2021; Prakash & Das, 2021) has focused on investigating the acceptance of contact tracing apps (such as the COVID Alert app) in developed countries, but with no

emphasis on millennials. In this regard, this study is among the first that examines the factors that promote the adoption of the COVID Alert app among millennials from a South African perspective. A focus on South Africa will contribute to providing insights into and the knowledge of the influential factors that stimulate the acceptance of COVID Alert app among millennials. To address this research gap, this study seeks to investigate the determinants that trigger the behaviour of millennials towards the adoption of the COVID Alert app in South Africa.

This study responds to a call in the literature (Alsaad & Al-Okaily, 2021; Duan & Deng, 2021; Ross, 2021) to uncover the adoption of contact tracing apps from a generational perspective. This is achieved by enriching the existing body of work on the drivers that promote the acceptance of the COVID Alert app among millennials in an emerging economy. In addition, the study provides useful guidelines that health practitioners and policy-makers alike can adopt in stimulating the behaviour of millennials towards adopting the COVID Alert app. It is thus important for health practitioners and policy-makers to gain knowledge about the core factors that foster the adoption behaviour of millennials towards the COVID Alert app in order to control the spread of the coronavirus effectively.

The remaining sections of this study focus on providing a discussion on the problem statement, the research objectives, the theoretical background, the research hypotheses, the research methodology and results, the managerial implications, and areas for future research.

PROBLEM STATEMENT

The COVID Alert app is considered to be an important tool that helps to identify the areas where users are at risk of contracting the coronavirus, thereby reducing its spread (SA Coronavirus, 2022). This indicates that the COVID Alert app is useful in identifying the movement of infected users and sending notifications to those who have been exposed to the coronavirus, thus contributing to early isolation and lowering its transmission (WHO, 2021). Notably, millennials have a large sheer (more than 3 billion) of the population, incorporate technology into their lives, and are drawn to apps that provide information about their physical and mental health (Euromonitor, 2021). This implies that millennials present a unique and sizeable market for the

adoption of the COVID Alert app due to their high level of app usage and the need to maintain a healthy lifestyle (Ross, 2021). However, the acceptance of the COVID Alert app among the millennial cohort has not yet been explored in an emerging economy such as South Africa.

The existing research (Alsaad & Al-Okaily, 2021; Duan & Deng, 2021; Hauff & Nilsson, 2021; Nguyen et al., 2021; Prakash & Das, 2021) has concentrated on predicting the factors that influence the adoption of contact tracing apps in Western and Asian countries. For this reason, limited research has been found both internationally and in South Africa, that has investigated the factors that promote the acceptance of the COVID Alert app among millennials. This implies that there is a great need for further research that explores the influential factors that trigger the behaviour of millennials towards the adoption of the COVID Alert app. It is therefore imperative to gain insights into the factors that trigger such behaviour in South Africa.

RESEARCH OBJECTIVES

The main objective of this study is to investigate the factors that trigger the behaviour of millennials towards the adoption of the COVID Alert app in South Africa.

To achieve this primary objective, the following secondary objectives were formulated:

- To present a demographic profile of the respondents.
- To investigate the relationship between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention towards the COVID Alert app.
- To propose a quality framework for evaluating the linkage between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention towards the COVID Alert app.

THEORETICAL BACKGROUND

A perspective on millennials

The millennial cohort consists of individuals born between 1980 and 2000, and who love to engage with each other on social networks and mostly buy products and services online (Leon, 2018). Millennials have more intuitive knowledge of digital technology than earlier generations and are attracted by brands that offer innovative ideas and solutions that address their specific

needs (Dilotsotlhe, 2021; Ledikwe, Stiehler-Mulder & Roberts-Lombard, 2020). Euromonitor (2021) posits that millennials account for more than half the world's population, have the largest spending power and are socially responsible. From a South African perspective, millennials represent a sizable share (27%) of the country's population, and have a greater spending power (R14 million) (Euromonitor, 2021). Furthermore, millennials have a high degree of digital adoption, are more concerned about their health and wellness, and will thus be motivated to adopt the COVID Alert app (Euromonitor, 2021). Therefore, the current study focuses on millennials in order to understand their perceptions and attitudes towards accepting the COVID Alert app.

The extended unified theory of acceptance and use of technology

The current study is grounded in the extended unified theory of acceptance and use of technology (UTAUT) to explain the theoretical connection between the constructs in the proposed conceptual model (see Figure 1). The UTAUT theory was introduced by Venkatesh, Morris, Davis and Davis (2003) to uncover the antecedents of technology adoption and usage. This theory was developed by combining the widely adopted theories and models containing the theory of reasoned action, the technology acceptance model, the theory of planned behaviour, the innovation diffusion theory, the social cognitive theory, the motivation model, the PC utilisation model, and the extended technology acceptance model (Venkatesh, 2021). The UTAUT explains that four main factors - expected performance, effort expectancy, social influence, and facilitating conditions influence behavioural intention and, in turn, actual behaviour (Venkatesh, 2021). These four factors are then moderated by the elements of individual differences (i.e., gender, age, experience and voluntariness of use (Venkatesh et al., 2003). The UTAUT has been empirically tested by a number of researchers in technology acceptance studies as a theoretical foundation for examining the acceptance of technological innovations (Thusi & Maduku, 2020; Rahman, Das, Hossain & Tajrin, 2021). More specifically, UTAUT has recently been applied within a COVID environment to determine the factors - such as performance expectancy, effort expectancy, social influence, facilitating conditions, and attitude that influence the adoption of contact tracing apps (Alsaad & Al-Okaily, 2021; Duan & Deng, 2021; Hauff & Nilsson, 2021; Nguyen et al., 2021; Prakash & Das, 2021). This empirical evidence provides the rationale for

the current study to adopt the UTAUT as a theoretical lens for uncovering the determinants that influence the adoption of the COVID Alert app.

CONCEPTUAL MODEL AND HYPOTHESES

The influence of performance expectancy on attitude

Venkatesh (2021) describes 'performance expectancy' as the extent to which a user believes that the use of a particular innovation will enhance their job performance. For the purpose of this study, performance expectancy relates to the extent to which millennials perceive the COVID Alert app to be useful in protecting them from possible exposure to the coronavirus. This implies that millennials will be motivated to use the COVID Alert because they perceive it to be helpful in safeguarding their lives. Performance expectancy is one of the core factors that affect attitude, owing to its ability to influence the cognitive perceptions of consumers (Cai, Yuen, Xie, Fang & Wang, 2021; Smyth, Chen, Donzella &Woodman, 2021). Existing research has established that performance expectancy has a positive effect on attitude towards technological innovations (Bu, Wang, Jiang & Jiang, 2021; Patil, Tamilmani, Rana & Raghavan, 2020). Based on these empirical findings, the hypothesis is offered as follows:

H_1: There is a positive association between performance expectancy and attitude towards the adoption of the COVID Alert app

The influence of effort expectancy on attitude

'Effort expectancy' is the extent to which a user experiences ease in operating a technology (Venkatesh, 2021). In the context of this study, effort expectancy is the extent to which millennials believe that the COVID Alert app requires little effort to install and use it. For this reason, millennials will be motivated to adopt the COVID Alert app because it is easy to learn and can be operated across multiple smart devices. Effort expectancy directly impacts the level of attitude towards digital innovations (Altay & Okumus, 2021; Sumak & Sorgo, 2016). This finding is validated by Chawla and Joshi (2021) and by Pitchay, Ganesan, Zulkifli and Khaliq (2021), who confirm that, if customers perceive the COVID Alert app to require little mental and physical effort to use it, this can elevate their attitude towards using it. On the basis of these empirical findings, the following hypothesis is proposed:

H_2: There is a positive association between effort expectancy and attitude towards the adoption of the COVID Alert app

The influence of social influence on attitude

'Social influence' relates to the extent to which a user relies on the opinions of family and friends about using a particular innovation (Venkatesh, 2021). For the purpose of this study, social influence refers to the extent to which a millennial will adopt the COVID Alert app, based on the opinions of significant others. This implies that, if family and friends perceive the COVID Alert app to be useful in the fight against the spread of the coronavirus, then a person will be motivated to accept the app. Social influence has been found to have a positive effect on the attitude towards the use of technological innovations (Chawla & Joshi, 2020; Upadhyay, Upadhyay, Abed & Dwivedi, 2022). This notion is supported by Aksoy, Alan, Kabadayi and Aksoy (2020) and by Sharma, Singh, Pratt and Narayan (2021), who found that social influence has a direct relationship with attitude. Based on these empirical findings, the following hypothesis is offered:

H_3: There is a positive association between social influence and attitude towards the adoption of the COVID Alert app

The influence of facilitating conditions on attitude

According to Venkatesh (2021), 'facilitating conditions' refers to the extent to which users believe that organisational support and technical infrastructure is available for using a particular technology. In line with the principle focus of this study, facilitating conditions relate to the extent to which resources and support systems are available and in place to promote the adoption of the COVID Alert app. This suggests that millennials will base their choice to use the COVID Alert app on the skill and knowledge required to install and operate the app on their smart devices. Facilitating conditions is an important factor in generating favourable attitudes towards the use of technological innovations (Alshare, Alomari, Lane & Freeze, 2019; Turan & Kara, 2018). The prior studies of Buabeng-Andoh and Baah (2020) and Lin (2022) validate this finding, pointing out that facilitating conditions have a positive impact on attitude. On the basis of these empirical findings, the following hypothesis is proposed:

H_4: There is a positive association between facilitating conditions and attitude towards the adoption of the COVID Alert app

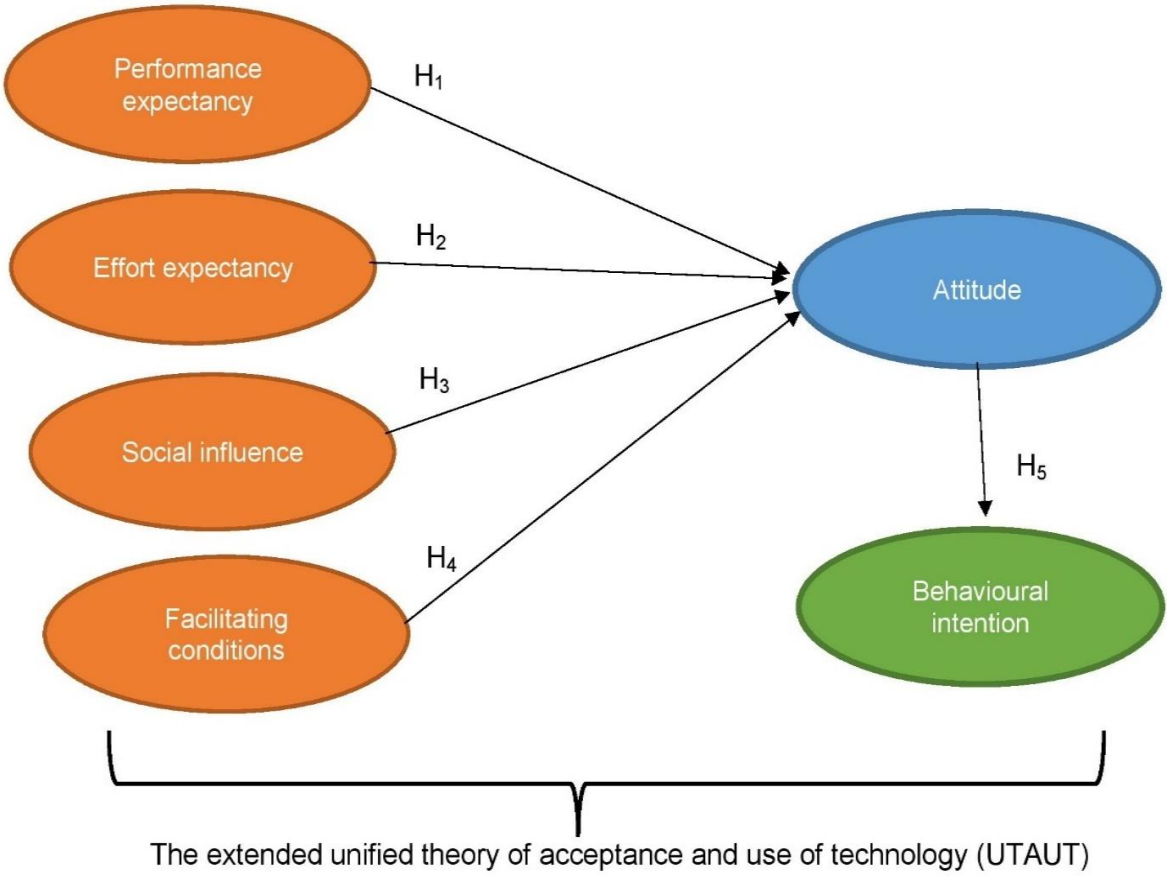
The influence of attitude on behavioural intention

'Attitude' refers to consumers' favourable or unfavourable evaluation of a particular innovation (Patil et al., 2020). For the purpose of this study, attitude relates to the extent to which millennials hold favourable or unfavourable feelings about the use of the COVID Alert app. This means that, if millennials consumers have positive feelings about the COVID Alert app, they will be motivated to install and use it on their smart devices. Attitude is considered to be an influential driver in predicting behavioural intention towards technological innovations (Rahman et al., 2021). According to studies conducted by Bu et al. (2021) and by Yip, Lo, Ho and Chiu (2021), attitude has a significant influence on behavioural intention. Based on these empirical findings, the hypothesis below is proposed:

H_5: There is a positive association between attitude and behavioural intention towards the adoption of the COVID Alert app

The overarching theoretical lens for this study is the UTAUT, which provides a theoretical foundation for the interrelationship between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention. The conceptual model examines the influence of performance expectancy, effort expectancy, social influence, and facilitating conditions on attitude and, in turn, how the promotion of attitude can influence the level of behavioural intention. Figure 1 illustrates the proposed model for uncovering the connection between the proposed constructs in this study.

Figure 1: Conceptual model



RESEARCH METHODOLOGY

The current study followed a quantitative and descriptive research design. The target population was millennial consumers aged between 18 and 40 years, who have used a smart device in the past twelve months and are based in the Gauteng Province of South Africa. The reason for selecting Gauteng Province as the primary location for conducting this research, was that it is one of the most popular provinces among millennials in South Africa (Stats SA, 2021).

A convenience sampling approach was used to invite respondents to take part in this study. This sampling approach was considered suitable for this study, as it helps to improve sampling adequacy by gathering a large number of responses at a lower cost and within a short space of time (Hair, Black, Babin & Anderson, 2016).

Self-administered paper-based questionnaires were used to collect data for the empirical phase of the study. The data were gathered by a data collection company, and strict COVID-19 protocols

were followed in engaging with the respondents. The structured paper-based questionnaire included a purpose statement, screening questions, demographic information, and measurement statements related to performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention. A five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) was used to determine respondents' perceptions of the proposed constructs in this study. As a result, the empirical scales for the different constructs were adapted from the previous studies of Sharma, Dwivedu, Jones, Kraus, Sharma, and Singh (2020) and Walrave, Waeterloos and Ponnet (2020).

A total of 270 responses was collected over a five-week period. Out of the total of 270 questionnaires that were fielded, only 261 responses were considered as complete, yielding a 97% response rate. Hair et al. (2016) provides support for this realised sample, as it falls within the minimum sample size range of 200-500. After the data collection had been finalised, SPSS (version 27) was used to capture, edit, clean, and analyse the data. The data were analysed by means of descriptive statistics, reliability analysis, and confirmatory factor analysis (CFA). The proposed conceptual model (see Figure 1) was empirically tested in AMOS (version 27) using the structural equation modelling (SEM) procedure.

RESULTS

Demographic profile of respondents

Table 1 provides the demographic profile of the respondents. More females (54%) than males (46%) that took part in this survey. The results also showed that most of the respondents were Black (88.50%), followed by those who were Coloured (5%), White (3.10%), and Indian (2.70%). Lastly, the results indicated that the greatest number of respondents had a university degree (41%), followed by a tertiary (diploma) (23%) qualification.

Table 1: Demographic characteristics of respondents

Demographics		**Frequency**	**Percentage (%)**
Gender	Female	141	54
	Male	120	46
	Total	261	100
Race	Black	231	88.5

	Coloured	13	5
	White	8	3.1
	Indian	7	2.7
	Other	2	0.7
	Total	261	100
Education	University degree (B-degree or Honours) completed	107	41
	Tertiary (diploma) education completed	60	23
	Matric completed	59	22.6
	Postgraduate degree (Masters or Doctorate) completed	14	5.4
	High school completed	11	4.2
	Primary school completed	5	1.9
	Other	5	1.9
	Total	261	100

Validity and reliability of the measurement model

The results related to the validity and reliability of the measurement model are summarised in Table 2.

Table 2: Measurement model results summary

Construct, item	Factor loadings	Composite reliability	AVE	Shared variance	Cronbach's alpha (α)
Performance expectancy (PE)					
I believe that using the COVID Alert app will improve my knowledge about the hazard of being infected by COVID-19	0.920	0.900	0.750	0.172	0.894
I believe that the use of COVID Alert app can help reduce the spread of COVID-19	0.862				
I believe the use of COVID Alert app would be less complicated for me	0.812				
Effort expectancy (EE)					
I believe the COVID Alert app would be easy to use	0.784	0.831	0.620	0.421	0.826
I believe the use of the COVID	0.760				

Alert app would be less complicated for me.					
I believe that I would be skilful in using the COVID Alert app	0.818				
Social influence (SI)					
I think that people in my life believe I should use the COVID Alert app	0.790	0.893	0.736	0.172	0.892
I believe that people who influence me will advise me to use the COVID Alert app	0.903				
I feel that people whose advice I follow will recommend that I use the COVID Alert app	0.876				
Facilitating conditions (FC)					
I have the required knowledge to use the COVID Alert app	0.694	0.738	0.500	0.364	0.735
I have the necessary resources to use the COVID Alert app	0.706				
I believe the COVID Alert app will be compatible with other technologies that I use on my smartphone	0.687				
Attitude (AT)					
I think that installing the COVID Alert app on my smart phone is a good idea	0.860	0.933	0.775	0.172	0.932
I believe that installing the COVID Alert app on my smart phone would be pleasant	0.860				
I think that installing the COVID Alert app on my smart phone would be appealing	0.887				
I like the idea of installing the COVID Alert app on my smart phone	0.913				
Behavioural intention (BI)					
I intend to install the COVID Alert app on my smart phone in the future	0.942	0.941	0.762	0.172	0.935
I predict that I would install the COVID Alert app on my smart phone in the future	0.897				
I plan to install the COVID Alert app on my smartphone in the near future	0.934				
I always try to install the COVID Alert app on my smartphone.	0.701				

I will recommend to others to install the COVID Alert app on their smart phone.	0.869				
Model fitness					
Normed chi-square ($x2/df$)	1.958				
TLI	0.889				
CFI	0.900				
RMSEA	0.061				

The measurement model was assessed using a CFA procedure in order to assess the reliability and validity of the data collection instrument. The results indicated that all the constructs in the proposed conceptual model had satisfactory reliability, as the Cronbach's alpha and composite reliability values were above the threshold of 0.70 (Hair et al., 2016). Face validity was ensured through the use of reliable and valid scales that were adapted from existing studies in the service literature. A pilot test was also conducted to verify the questionnaire prior to data collection. Discriminant validity was achieved, as all the average variance extracted (AVE) values were greater than the corresponding shared variances. Furthermore, the factor loadings and AVE values were above the acceptable limit of 0.50, thereby contributing to convergent validity. The measurement model had a favourable level of fitness, as all the indices - Chi-square/degrees of freedom (x^2/df=1.958), Tucker–Lewis index (TLI=0.889), Comparative fit index (CFI=0.900), and Root mean square error of approximation (RMSEA=0.061) - were within the required norm, thereby confirming the convergent validity of the questionnaire.

Structural model analysis

A structural model assessment was performed to evaluate the significance of the hypothesised relationships in the proposed conceptual model (Figure 1) using a maximum likelihood approach via SEM. This procedure involved the use of standardised regression weights (β) and the p-values of the different paths to confirm the acceptance of the hypotheses. The results from this analysis are shown in Table 3.

The results from Table 3 suggest that performance expectancy (β=0.576, p=0.000), effort expectancy (β=0.113, p=0.010), social influence (β=0.372, p=0.000), and facilitating conditions (β=0.352, p=0.001) had a significant influence on the attitude towards the adoption of the

COVID Alert app, which further provided empirical support for H_1, H_2, H_3, and H_4. This implied that performance expectancy was the strongest predictor of attitude, followed by social influence, facilitating conditions, and effort expectancy. Furthermore, attitude had a positive effect on behavioural intention (β=1.102, p=0.000) towards the adoption of the COVID Alert app, thus H_5 was statistically supported. With this in mind, performance expectancy, effort expectancy, social influence, and facilitating conditions contributed 74% of the variation in attitude, while attitude predicted 82% of the variation in behavioural intention. As a result, the structural model had an acceptable level of model fitness (x^2/df=1.875, TLI=0.956, CFI=0.966, and RMSEA=0.058).

Table 3: Hypothesis testing and goodness-of-fit results for the structural model

Hypotheses	**Direct path estimates (β)**	**Probability value *(p)***	**Hypothesis result (p<0.05)**	**Variance explained (R^2)**
H_1 Performance expectancy ⟶ Attitude	0.576	0.000	Supported	0.740
H_2 Effort expectancy ⟶ Attitude	0.113	0.010	Supported	
H_3 Social influence ⟶ Attitude	0.372	0.000	Supported	
H_4 Facilitating conditions ⟶ Attitude	0.352	0.001	Supported	
H_5 Attitude ⟶ Behavioural intention	1.102	0.000	Supported	0.820
Model fit statistics				
x^2/df	1.875			
TLI	0.956			
CFI	0.966			
RMSEA	0.058			

DISCUSSION

First, the results revealed that performance expectancy (β=0.576, p=0.000) had a significant influence on attitude towards the use of the COVID Alert app. This finding is consistent with the propositions of UTAUT and the previous studies of Cai et al. (2021) and Smyth et al. (2021) who established that performance expectancy had a positive effect on attitude. This implies that millennials will adopt the COVID Alert app if they believe that it will provide them with the benefit of protecting them from possible exposure to the coronavirus.

Second, the results indicated that effort expectancy (β=0.113, p=0.010) was significantly related to attitude towards the acceptance of the COVID Alert app. This finding is aligned with the

propositions of UTAUT, and is corroborated by Chawla and Joshi (2021) and Pitchay et al. (2021), who argued that effort expectancy has a direct influence on attitude. This suggests that millennials will adopt the COVID Alert app if it requires little effort in installing and operating it from their smart devices.

Third, the results showed that social influence (β=0.372, p=0.000) had a positive impact on attitude towards the use of the COVID Alert app. This finding is congruent with the propositions of UTAUT, and with the empirical work of Aksoy et al. (2020) and Upadhyay et al. (2022), who speculated that the promotion of social influence leads to a favourable attitude towards technological innovations. This implies that millennials rely on the opinions of family and friends before deciding to adopt the COVID Alert app.

Fourth, the results highlighted that facilitating conditions (β=0.352, p=0.001) had a direct influence on the level of attitude towards the use of the COVID Alert app. This finding is supported by the propositions of UTAUT, and by the previous research of Buabeng-Andoh and Baah (2020) and of Lin (2022), who posited that facilitating conditions have a significant effect on stimulating favourable attitudes towards technological innovations. This suggests that millennials will accept the use of the COVID Alert app if there is sufficient infrastructure and technical support for installing and operating the app on their smart devices.

Last, the results proved that there was a positive and significant relationship between attitude and behavioural intention towards the adoption of the COVID Alert app. This finding is congruent with the propositions of UTAUT, and with the empirical studies of Bu et al. (2021) and Yip et al. (2021), who discovered that the cultivation of a positive attitude can lead to an increased behavioural intention towards technological innovations. This implies that, if millennials hold favourable attitudes towards the COVID Alert app, this will lead to increased acceptance and usage of the app.

THEORETICAL IMPLICATIONS

The current study extends the UTAUT theory through the inclusion of attitude to the original factors (performance expectancy, effort expectancy, social influence, and facilitating conditions) that foster the acceptance of technological innovations. For this reason, the study is among the first to examine the influence of performance expectancy, effort expectancy, social influence, facilitating conditions on attitude, and in turn, how attitude elevates the level of behavioural intention from a millennial perspective. The findings demonstrate the importance of attitude in the adoption of the COVID Alert app. In addition, the extended UTAUT framework has been empirically tested and confirms significant relationships between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention. Therefore, this study has addressed the limited understanding of the factors that promote the adoption of the COVID Alert app among millennials from the context of an emerging economy. This was achieved by providing a richer understanding of the key determinants that stimulate the adoption of the COVID Alert app as grounded in the UAUT theory, which serves as a reference for future research in technology adoption studies.

Interestingly, the current study contributes to the explanatory power of the UTAUT theory by providing a useful theoretical model and measurement scales for the different constructs, thereby providing future research opportunities for investigating the acceptance of contact tracing apps (such as COVID Alert app) among millennials in both developed and developing economies. The study also provides a deeper understanding of the theoretical connection between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention from the perspective of an emerging economy. This is an important contribution, as there is limited research on the factors that promote the adoption of contact tracings apps in emerging economies such as South Africa.

A proposed conceptual model was empirically tested and was proven to have a strong predictive power in examining the factors (performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention) that trigger the behaviour of millennials towards adopting the COVID Alert app. The conceptual model possessed a significant variance (74% - 82%), which provides a foundation for explaining the adoption

behaviour of millennials towards the COVID Alert app. Therefore, the conceptual model enriches the service literature by providing the core constructs that are grounded in UTAUT theory and can be used further by researchers to gain insights into the behaviour of millennials towards the acceptance of contact tracing apps.

Finally, the majority of studies that have examined the acceptance of contract tracing apps have concentrated on developed economies (such as Western and Asian countries), with little focus on emerging economies (such as African countries). Moreover, previous studies have mostly focused on uncovering the UTAUT factors that promote the acceptance of contract tracing apps across different generational cohorts. Thus less attention has been given to understanding the adoption behaviour of millennials towards contact tracing apps from an emerging economy. This study contributes to expanding the theoretical relevance of the UTAUT by providing key findings that uncover the acceptance of the COVID Alert app among millennial customers from the context of the emerging economy of South Africa.

MANAGERIAL IMPLICATIONS

The current study has implications for health practitioners and for policy-makers who are interested in understanding the behaviour of millennials towards adopting contact tracing apps (such as the COVID Alert app). For this reason, the guidelines below have been proposed to offer insights into the acceptance of the COVID Alert app among millennials.

The promotion of performance expectancy to enhance the level of attitude

The study established that there is a significant association between performance expectancy and attitude. It is important for health practitioners and regulators to promote the performance expectancy of the COVID Alert app, given its influential role in improving the attitude level of millennials. This can be addressed by using social media advertorials that promote the efficiency of the COVID Alert app. This implies sharing knowledge about the ability of the app to provide current and up-to-date information about the number of positive cases, symptoms, potential exposure, and how to limit the spread of the coronavirus. This information would create positive

impressions in the minds of consumers, and influence their attitudes towards accepting the COVID Alert app.

The promotion of effort expectancy to enhance the level of attitude

The results indicated that there is a positive relationship between effort expectancy and attitude. This suggests that health practitioners and regulators should ensure that the COVID Alert app is easy to operate by enabling users to send and receive notifications in real time without any delays. Online video demonstrations could be shared on national television stations and social media platforms to create awareness of how to install and operate the COVID Alert app, which in turn, would stimulate favourable attitudes towards adopting it.

The promotion of social influence to enhance the level of attitude

Social influence was found to have a positive influence on attitude. This implies that health practitioners and regulators should provide clear and trustworthy information about the core benefits of operating the app. These benefits include the ability of the COVID Alert app in protect their livelihoods and safeguard them from possible exposure to the virus. Special advertorials in the form of medical and celebrity endorsements could be used to highlight the efficiency of the COVID Alert app. A reward system such as offering five gigabytes of data to consumers who share and receive the most likes and comments about the promotional message behind the COVID Alert app, would ultimately create favourable attitudes towards its use.

The promotion of facilitating conditions to enhance the level of attitude

Facilitating conditions was reported to impact positively on attitude. This suggests that health officials and regulators should work in close partnership with software developers and telecommunication providers to ensure that there are favourable conditions (e.g., a step-by-step guide to downloading and using the app) to promote positive attitudes towards the COVID Alert app. This implies that there is a need for the public to be sensitised with information on the different smart devices that support the app through the use of chat bots, printed manuals, and online manuals that details how to operate the app, which could stimulate favourable attitudes towards its use.

The promotion of attitude to enhance the level of behavioural intention

The results proved that there is a positive correlation between attitude and behavioural intention. It is critical for health practitioners and regulators to create a positive experience for consumers when they download, install, and operate the COVID Alert app. For this reason, creative guides, video tutorials, and supportive information must be presented to users across social media platforms, television advertorials, and YouTube. These guides should highlight that the app is free to download, is available for most smart devices, does not require payment for mobile data, and always keeps users' identities private. This will create favourable impressions in consumers' minds about the usability of the app, which, in turn, would stimulate behavioural intention.

CONCLUSION

The aim of the study was to investigate the determinants that trigger the behaviour of millennials towards the adoption of the COVID Alert app in the emerging economy of South Africa. This was achieved by examining the theoretical connection between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and behavioural intention. The empirical findings revealed that performance expectancy, effort expectancy, social influence, and facilitating conditions had a positive influence on attitude, while attitude exerted a strong effect on the level of behavioural intention. Furthermore, the study offered useful guidelines that health practitioners and policy-makers could adopt to understand the behaviour of millennials towards accepting the COVID Alert app. The implementation of these guidelines could provide clear insights into predicting the behaviour of millennials towards the COVID Alert app, which would assist in curbing the spread of the coronavirus and safeguarding the lives of individuals.

RESEARCH LIMITATIONS AND FURTHER RESEARCH

The study has a few limitations that provide scope for future research. The current study was limited to evaluating the behaviour of millennials towards adopting the COVID Alert app in the Gauteng Province of South Africa. In addition, the study used a self-administered questionnaire, which meant that only respondents who owned a smart device could participate in the survey. Thus the findings from these respondents cannot be generalised to other generational cohorts in

South Africa or internationally. It is recommended that further studies should explore other influential factors (such as innovativeness, perceived risk and societal benefit) that could extend the proposed conceptual model and enhance its practicality in the health sector. In line with this recommendation, future research should include the other generational cohorts (Generation x, Generation z, etc.) through which a comparative analysis could be done to gather insights into the key factors that affect the adoption of contact tracing apps in emerging economies.

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PART TWO

LIBRARIES IN COVID – 19 AND 4IR ERA

ACADEMIC LIBRARIES IN IOT ERA: MOVING TOWARDS SMART SERVICES

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Abstract
Over the years, libraries across the globe have been using Information and Communication Technology (ICT) for effective library service delivery which has now brought about the use of more dynamic global technologies that could enabled users to be served with or without human intervention like the Internet of everything popularly known as Internet of Things (IoTs). IoT is about enabling objects to collect data and transfer them over a network without human intervention with the help of: Internet, Sensors and Radio-Frequency Identification (RFID) in accordance with the ways it is being used by other services oriented organisations such as: insurance companies, hospitals, schools, restaurants, filling stations where various innovative solutions are deployed. This paper reviewed relevant literature on IoTs; discussed its application in customer service oriented organisations of which libraries are not exempted; identified its merits and demerits; and recommended future challenges and proffered solutions to the identified challenges. The paper concluded by encouraging libraries in developing countries Nigeria in particular to automate their resources and formulate policies that will fast track the full adoption of the IoT otherwise the use of IoT in Nigerian libraries may be more of a mirage; the authors recommendee that security of users' data while sharing data with third party must be squarely addressed; all academic libraries must ascertain the cost implication of starting; implementing and sustaining IoT in their organisations; staff training should be organised on a regular basis; there must be stable power supply in all academic libraries and the government at all levels must support the efforts of the libraries to facilitate their journey towards having the desired Smart libraries in the country.

Keywords: Internet of Things (IoT); Smart Services; Academic Libraries;Era of

INTRODUCTION

Technology has pervaded all aspects of human endeavour including library services with the ultimate aim of providing better and faster services. Information services in form of information delivery and dissemination in academic libraries are not exempted especially with the advent and the growth of the

ubiquitous technology of the age called the Internet. Nowadays, robots are being used for library operations and services such as: reference services, temperature monitoring tool, statistical tool, information organisation tools and other smart services are being deployed as evident from the niversities of Lagos and Pretoria libraries to mention but a few. Robots are deployed to collect and share data among themselves without human intervention thereby cutting down the resources in terms of time, energy, salaries and wages and many more. The application of such technology has brought about what we call smart libraries, this no doubt has affected various aspects of our everyday life including but not limited to transportation – where a car would alert its owner whenever there is high traffic or danger ahead and would recommend an alternative road to follow. The most alarming type of the smart technologies is the Internet of Things, what is it that makes it to be called the Internet of Things? It is its ability to use wireless communication devices for data collection, processing and dissemination of information either through robot to robot or robot to human. The robot to robot communication is also known as "Machine-to-Machine (M2M)" form of communication. Bayani, Segura Alvarado and Loaiza (2018a). The previous studies of Hahn (2017), defined the IoT as the "network of physical objects that use embedded technology to communicate and sense or interact with their internal states or the external environment" this is in-line with the assertions of Xueling, (2018); Olson et al., (2015); Li et al., (2015); Wojick, (2016); Liu et al., (2017) as cited by Liang (2018) who opined that IoT is a "dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual 'Things' have identities, physical attributes, and virtual personalities and use intelligent interfaces, that are seamlessly integrated into the information network".

In a nutshell, the authors were of the opinion that IoT is a network of interconnected things/ devices that are embedded with sensors, software, network connectivity and other necessary technologies that fine tune the collection and sharing of data to make the system responsive. The IoT works with smart technologies through users' intelligent interfaces to interact, sense, process and disseminate information to recipients. It is worth knowing that for any device to be called SMART, the components must be able to sense signals from compatible devices from the environment; process data; store information for future use and share information for prompt response. This is to say that in a smart library, a sensor/device must be able to identify, see, interact, share or receive data from networked devices within or around the library environment through connections like bluetooth, wireless fidelity (WiFi), wide area network (WAN) or cellular networks etcetera. The beauty of these smart technologies in academic libraries is their ability to work with or without human assistance in order to reduce the workload for library personnel.

In a similar view, IoT according to Nag and Nikam (2016) is about "the use of intelligently connected devices and system to obtain data gathered by some embedded sensors, actuators in machines and other physical objects. IoT uses connecting media such as wireless sensor network and physical objects to connect devices to each other and the Internet, with minimal direct human intervention to deliver service that meet the needs of wide range of users". Nowadays, application of IoT in various organisations such as: manufacturing, health, commercial, logistics etc has revolutionised the way and speed at which data are collected, processed and disseminated. In service oriented organisations of which libraries are not exempted, IoT is being applied in order to monitor consumers'/ clienteles' activities for effective transactions and service delivery. It is likely to play a bigger role in areas like: information analysis, information organisation, automation and control. For example, it is possible to track movement of academic library resources and monitor interaction between library users and these resources through real time events and sensor driven analytics.

IoT technologies are used in education sector for lectures, training and seminars to be conducted and attended by using interactive displays embedded with multi-touch, dry - erase and natural writing technology, plus personalised cloud-based lesson delivery software for mostly educators and students. All these burn down to the fact that the inevitable change has brought about doing what we have been doing in a traditional way in a more automated manner for smart library service delivery to our end users using smart technologies. Auto insurance companies can introduce vehicle telematics in some smart cars to enable them assess the drivers' behaviour and accordingly fix the rate of premium based on the risk factors. The same type of implications can be seen in other types of insurance policies, not depending completely on historical information, thus giving a chance for better risk management. IoT will ultimately enable industry to minimize loss and introduce safety techniques in each and every type of insurance they sell to the public.

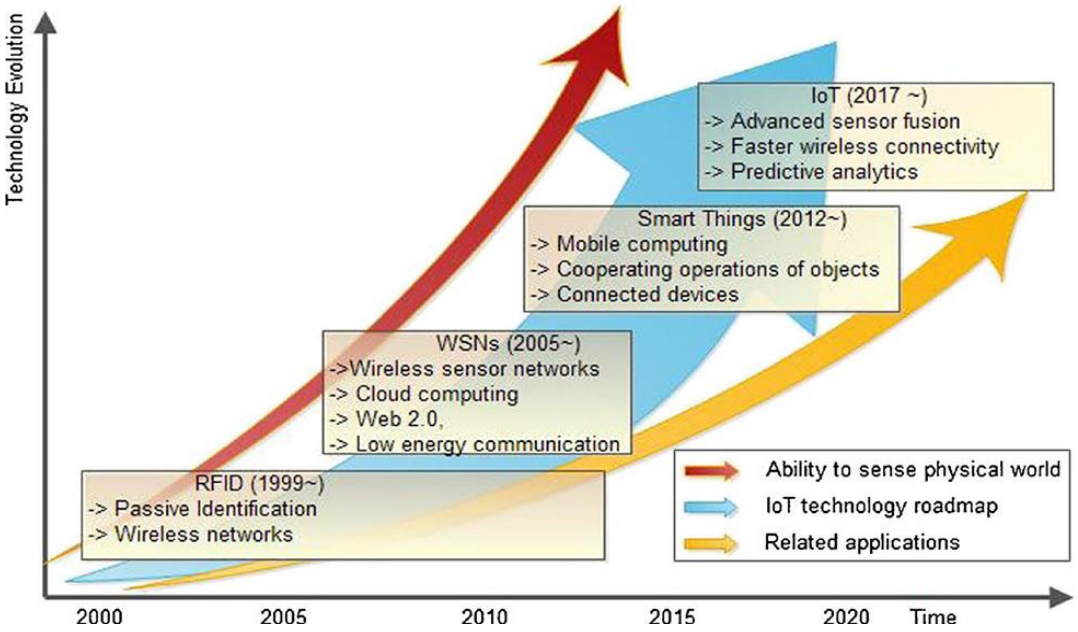
THE CONCEPTS OF IOT AND TECHNOLOGIES

The IoT

The concept of Internet of Things (IoTs) was coined to mean the "Internet" of "Everything" where things could mean a human being walking with a sensor to either monitor the heart performance or general health status of such person, or a motor vehicle using sophisticated sensor to monitor everything around the vehicle or happenings on the road for effective decision making or it may even be a home placed on a surveillance to monitor movements within or around the building or prevent any danger from striking the owners or home itself through the use of smart technologies.

The IoT development has over the years gone through several evolutionary stages – the earlier stage (pre-internet era) is the first stage and has been characterised by the use of World Wide Web (WWW) also known as the Internet of contents, which is a network of linked html for information sharing from human to human; the second stage was an advanced version of the www which is otherwise known as the internet of services (Web 2.0) and is characterised with the use of relevant technologies and social networking sites like linkedIn, facebook, twitter, blogs, Instagram, delicious etc. the stage brought about a paradigm shift in the way libraries operates and transacts; the third stage consists of Web 3.0 also known as Semantic Web which makes direct communication between machine to machine easy via the Internet. This third stage was responsible for the machine and search engines intelligence performance which makes human thinks that machines are intelligent. The stage according to Whitmore et al., (2015) has nurtured the IoT which stands as the next evolution of the Internet (Evans, 2011). The trends is now moving towards the 5G technologies which are expected to match the needs of the future IoT application (Li et al., 2018).

Figure 1: Technology Evolution



Source: Gul and Bano (2018)

The duo traced the history of the IoT back to year 2000 as indicated by the researchers of this present work, with reference to the role played by the RFID up till 2005 where wireless sensor network (WSN) was used to power cloud computing and web 2.0 with low energy consumption; this era brought a pragmatic approach to how smart things became the order of the day using machine-2-machine (M2M) applications to facilitate data gathering and sharing process.

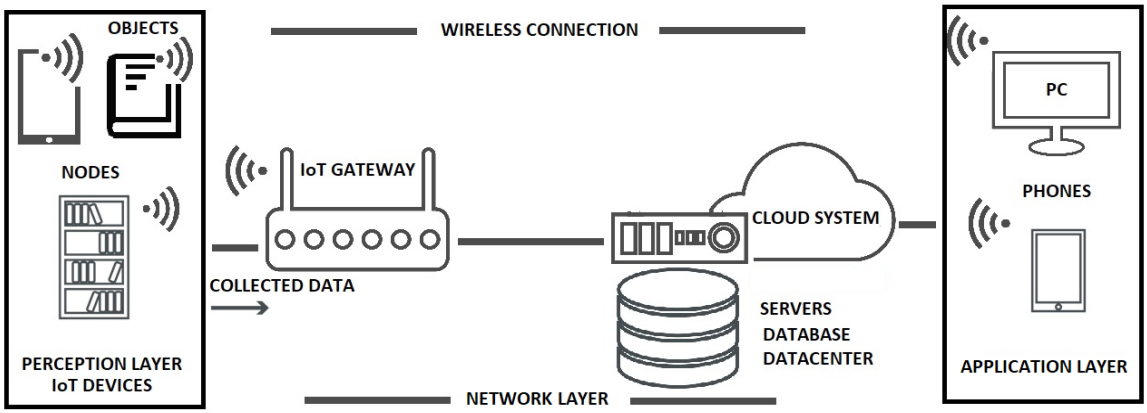
TECHNOLOGIES

There is no gain saying that, no single object can function as a complete system without the support of other components whether in-built or adjunct, so the case of IoT is; for IoT to function as a smart system of service delivery, it needs a set of technology to connect to objects. First and foremost, IoT must have a device for identification which will generate a unique identification code for each object. Then, another device needs to sense the object and measure various aspects of such object. IoT needs another facility to control the communication through Internet or other similar objects. More importantly, there must be a central server where data from all these objects will be collected and analyse by the user of the system.

Amongst such technologies use by IoT to function as a complete system, includes Radio Frequency Identification Device (RFID), energy harvesting technologies such as the ones found in implantable medical devices, wearable electronic devices, traffic alert signs, wireless sensor network (WSN) nodes, wireless communication devices (such as bluetooth, iBeacons), internet, WAN, sensors, cloud computing and advanced Internet protocol (IPv6) (Pujar and Satyanarayana, 2015). What does RFID do for IoT? It helps to identify and track all data of things, which can sensor, collect and process data to detect the changes in the physical status of an object, energy harvesting technologies help in low energy consumption of associated technologies, the data collected is stored on the cloud for further processing and wireless communication will facilitate communication and interaction between objects to take further course of action. These smart technologies helps in enhancing the power of network and enable smallest objects with a capacity to connect and interact. Smart phones would act as the main connecting link between objects and humans in interacting and conveying the messages.

These underlying technologies mentioned above enable any physical objects connected to Internet to link up with each other for effective communication. In some cases, there may be a central hub, which helps in connecting each of the objects to one another and more so, the cloud services helps in the collection and processing of data and provides users with the opportunity to find out what is happening and take necessary action through their mobile apps.

Figure 2: Three-layer architecture of an IoT scenario



Source: Bayani, Segura Alvarado and Loaiza (2018b)

The authors described the three layer architecture as follows;

a. The perception layer which is the physical layer includes the sensors (RFID, WSN etc.), the event parameters or identity existence of the object.
b. The network layer provides Internet connectivity between the objects, network devices, wireless or cable connections, cloud system, database, server system that transmits and processing the locally obtained data. It also includes the gateway component to receive the data sensed from the perception layer.
c. The application layer is in charge of providing applications and services to the human or non-human users (i.e. Machine to machine case). It can specify various processes, programs, and applications in which the IoT can be positioned as a smart library management system for effective library management.

Review of related literature

In the study of Pujar and Satyanarayana (2016), IoT was defined "In simple terms, Internet of things enables, any natural or man-made objects to communicate each other and transfer data using assigned IP address with or without human interventions. The duo has simply defined the Iot as the network of things that permits the sharing of information with other things without any interference from human ware.

Similarly, Miller (2018), defined IoT as a "network of physical objects (such as wearable devices, home appliances, security systems, personal and commercial vehicles, nanotechnology, manufacturing equipment, and so on) embedded with smart components (such as microprocessors, data storage, software, sensors, actuators etc.) and connected to other devices and systems over the Internet." Miller was of the opinion that IoT is a network of any tangible object that has the ability of collecting, processing, storing and communicating with other devices using the wearable or implantable technologies.

In a different view, Bansal et al. (2018), viewed Internet of Things (IoT) in libraries as a mind boggling association which has inserted constituents connected together and an enormous number of collaborations happen be it with one man to another or man to machine, machine to man, and with IoT object with object compatibility brings about extraordinary chance. Bansal et

al. were detailed in their definition of the Iot based on the fact that they viewed how Iot works from M2M and M2H. meaning that machine can communicate to machine, or machine can communicate to human or vice versa.

In a study conducted by Poslad (2009) had explained that smart technology is an electronic device, generally connected to other devices or networks via various wireless protocols, such as Bluetooth, Zigbee, Wi-Fi, LiFi, 3G, 4G network which can operate interactively and autonomously to some extent. In this study, smart devices are all modern artefacts that are made smart with computing power and linked to the Internet to form the Internet of Things (IoT). They range from small devices to wearable asset tracking devices that can be deployed to library services such as acquisition, circulation, cataloguing, reference services and other library operations. Using sensors, smart devices capture physical data such as light, temperature, presence and deliver the data to be analyzed and used. Such applications have a minimal collection of physical components and can be used irrespective of geographic location. They often come in different types, since they usually consist of a hardware layer (including a radio transmitting signals), a network layer (through which devices communicate with each other), and an application layer (through which end-user' order receives).

In the study of Qin (2018) IoT can be applied to library digital services and activities. Its application in the services cut across the provision of access to analogue and online collections, consultation, training, information sharing, provision of reference services, and provision of access to space and equipment while its application to activities were viewed in respect of marketing and promotion of library resources; storage; analysis; and selection of record; gathering of information and processing of information.

Bayani et al.(2018) listed among "other services that can be offered by the IoT in digital libraries, to include inventory control; theft detection; self-service; smart segmentation and shelf; book tracking; intelligent alert system; e-copy; smart gate; online waiting list; customer-relationship-management (CRM) for the library systems". This is a true assertion, because many academic libraries in Nigeria and other countries have either one or more of these facilities in place. A typical example can be seen in Abdullahi Fodiyo Library Complex of the Usmanu Danfodiyo

University, Sokoto where the Radio Frequency Identification system has been deployed to take the statistics of the users that visits the library on daily basis, it can track any unauthorized removal of library sensitive materials, perform the circulation activities by charging and discharging materials, support the OPAC services and generate the reports. In other state and private owned academic libraries, other

Similarly, Gupta and Singh (2018) viewed the IoT from the earlier stage of Internet were Internet were done in traditional ways for browsing and searching of information but now in a new dimension, “second life which is called Internet Plus. The word “Internet Plus” was first used by Chinese Prime Minister Li Keqiang in the Government Work Report in March 2015 which has attracted high attention from all walks of life. It is a new concept in which various facets like Mobile Internet, Cloud Computing, Big Data or Internet of Things are included. “Internet Plus” strategy means integrating Internet with other industries including traditional industries through Internet platform and information and communication technologies. It aims at creating a new ecology in new areas”. The duo opined that IoT is not different from the way cloud computing and big data are used.

In another veiw, Wojick (2016) "developed a theoretical model of IoT application in library service, and explored the potential of the IoT’s on library services based on the experiences from commercial sectors, and proposed that librarians being a source of information, particularly in academic libraries, can improve library services by innovative ways, and IoT can provide more tools and opportunities in sharing information, tracking and tracing service, and pushing notification services".

Similarly, Massis (2016) "explored IoT and its potential impact on the library from the security and privacy points of view, and proposed the Security of Things, security management approaches and the IoT potential disrupt services for libraries. Libraries can benefit from IoT in saving staff time, improving patron service, tailored service and recommendation service by collecting real-time data".

Application of IoT in academic libraries

Despite IoT being on a trial stage, libraries still value its potentials of value addition towards their service delivery and its ability to enhance library users experience, librarians are already familiar with this in libraries owing to the use of RFID, which does the similar thing of interacting with machines, tags and updates library management system with entries of books issued to users, but in case of IoT, the difference is on the Internet's ability to interact with a thing or object such as book and journals with little human intervention. Libraries have books, journals, CDs/DVDs, theses and many more physical objects and IoT can be a blessing in disguise to overcome some of the usual library problems such as misplacement of objects and their usage (Nag and Nikam, 2016b). The study conducted on application of IoT proves that remote access, low software costs, ease of implementation, in-house support and reduced operating costs, flexibility and adaptability, transparency, global visibility of the library resources and services, ease of use of resources, optimal users' satisfaction, and instantaneous delivery of service and effective utilisation of library resources are possible. This was corroborated by the proposals of Wang (2011) and Yan (2010) opined that smart library should be a new mode of future library aiming at achieving interconnection, efficiency and convenience through the IoT, cloud computing, and smart devices.

In a similar study conducted by Yusuf, Ifijeh, and Owolabi (2019) Poslad (2009) explained that smart technology is an electronic device, generally connected to other devices or networks via various wireless protocols, such as Bluetooth, 3G, 4G network, Zigbee, Wi-Fi, LiFi, which can operate interactively and autonomously to some extent. The authors of the study viewed smart devices as modern artefacts that are made smart with computing power and linked to the Internet to form the Internet of Things (IoT). With the aid of sensors, smart devices capture physical data such as light, temperature, presence and deliver the data to be analyzed and used. Such applications have a minimal collection of physical components and can be used irrespective of geographic location. They often come in different types, since they usually consist of a hardware layer (including a radio transmitting signals), a network layer (through which devices

communicate with each other), and an application layer (through which end-user's order receives).

The authors further described "smart technology as those electronic devices that use artificial intelligence to access and process data via internet protocol. Smart technologies can be used in library services such as in collection development, cataloguing and classification, circulation, reference services and other library activities. It is also possible to use smart technology to access social media platforms such as facebook, twitter, google, whatsapp, e-mail, youtube, tiktok, wechat and others to disseminate online information to university library users. The study identified different types of smart technologies used in university libraries as computer system, computer accessories, cellphone or smartphone and other communication devices including video conferencing devices, projector, scanner, printer, photocopying machines, digitizing machines, microsoft printers, radio-electronic copiers and others. Some smart electronic devices such as easy-to-read-books, assistive listening systems and others that can support the deaf or the physically challenged in university libraries are decoder machines with built-in telephones that convert the electronic signals of a closed caption video system into words written on a screen along with the video images for the hearing impaired library. The authors recommend that Nigerian government should play a key role in the deployment of appropriate smart technology infrastructure in the country and librarians in academic libraries in Nigeria need to take conscious steps at ensuring understanding of the concept and application of 'Internet of Things' to effective library service delivery. This will enhance maximization of the embedded benefits (Yusuf, Ifijeh, and Owolabi, 2019)".

Robots in Academic Libraries

IoT has been reported to have been helping librarians in their day to day operations and services in accordance with the teaching, learning and research activities of the parent institution using interactive displays embedded with multi-touch technology plus cloud-based frequently asked questions software customized for library services. A good example of this biggest IT revolution can be found in the University of Pretoria where the Department of Library Services employed the first client-service robot named Libby in May 28, 2019 to work in the Merensky Library like

Reference Librarian that interacts with users to answer their reference queries, provides guidance, conduct surveys, display marketing video to sensitize and entertain visitors and users of the library, Libby can perform other repetitive tasks that library personnel. According to Van der Walt (2019), the robot weighs 19kg and 90cm tall which makes it possible for her to interact with visitors in wheelchairs in English language, although efforts are being made to make her speak other local languages recognised by the institution. The aim of using the robot was not far from the need to evolve in line with the Fourth Industrial Revolution by redefining academic librarianship and fast tracking their movement towards the Blue Ocean through the deployment of latest technologies. Libby the robot has over 60 sensors, cameras and software integrations that enable her to receive and process various commands and requests. No doubt, the robot is able to perform intelligent tasks due to its ability to connect to WiFi of the institution and send information back and forth to answer reference queries or conduct a survey. Her brain has been linked to Watson, IBM's question-answering computer systems which process all queries that are being direct at her using an android-based software. Review of literature shows that Libby has been efficient in delivering library services without any loss of job on the part of library personnel rather it brought about innovations and 21st century service delivery or better still an indispensable tool for Smart libraries. All these burns down to the fact that the inevitable change has brought about doing what we have been doing in a traditional way in a more automated manner for smart library service delivery (https://www.up.ac.za/alumni/news/post_2825427-libby-the-library-robot-is-on-duty-at-up#nogo)

In 2020, the Platform Capital donated a robot (RobotScholar) to the University of Lagos. This robot works like that of the UP. The RoboScholar has been programmed to welcome users to the library, measure their temperature, identify users who have registered their details in its databases, interact with visitors to determine what they need, offers direct reference services to the users, help users in locating where library materials are, guide users on how to retrieve materials through OPAC search, play music, dance and play video to entertain guests. The University Librarian in her speech referred to the RoboScholar as a support service that has added value to their day to day operations, the use of robot has been reported to have reduced the

efforts and time used in answering simple ready reference queries in the library. (https://m.youtube.com/watch?v=-rXEVQ2Esqg)

Worthy of note in the literature reviewed is the opportunities that librarians can derive from using the Iot and its embedded technology for effective service delivery to their ever growing users' community. Some potential areas for implementation of the IoT in libraries included but not limited to the following:

Provision of access to information

Libraries provide instantaneous access to information thereby making space and time worriless in the era of IoT, this is simply because the era is characterised with the Internet of everything where information acquired in the library are made available to users instantly irrespective of the location or state of residence of the patrons. Libraries using a mobile app can create an interface for users to access all the available digital resources using Internet and other relevant technologies such as beacon for easy access to their numerous resources.

Information resource management

Libraries using RFID technology have RFID tags on each of their library materials to enable their virtual representation which can only be recognised on the library PC and RFID readers. Libraries can streamline the circulation services and fine collection through the integration of RFID tags in library users card. The IoT will be able to alert the affected users about overdue books and the amount of fine they owe to the library, to enable them return the overdue books and online payment without necessarily coming to the library to queue up.

Information retrieval

Libraries using mobile app, may provide virtual library cards to their users, which will enable them gain access to library facilities and use their resources. When a user accesses the library catalogue to locate the required resource(s), the library app stored on his or her mobile, will provide a map of the library guiding users to the location of resource(s). It can also provide additional information about a resource by connecting to a site such as Amazon, Oakleafbooks and other booksellers' websites so that users have detailed information about the information bearing resources.

Books reservation

Libraries provide users with the opportunity of making virtual reservation of library materials via the Internet. This is one of the beauties of the IoT in the library, library users can search for a book of his/her choice from the library WebOPAC using his/her smart phone with Internet access. After which the identified book will become accessible on the library shelve, with help of sensors the particular book shows signal or may begin blazing light. This way the actual book will distinguish its area for identification; there will be no any need to search through the books on the library racks looking for the books again, with that the librarian on duty will identify the book and hand it over to the library officer who will discharge the book.

Circulation management

The library collection with RFID tags on each of the items enables their virtual representation, which can be identified using computers and RFID tag readers. Through integration of RFID tags into member cards, circulation of items and fine collection can be streamlined. The IoT will be able to tell users about overdue books and how much fine they owe the library, to enable them return the overdue books and pay the fine online without coming to queue in the library circulation desk for payment.

Inventory control

Libraries have various other sources apart from books, journals, magazines such sources included but not limited to microfiche, video, audio, etcetera., can also be controlled by fixing sensors on them. With IoT, the development of everything can be followed. Despite the fact that RFID as of now fills piece of similar need for books, however with IoT since web is included, so it gives all the constant information on portable of the curator/supervisor and subsequently better stock control is conceivable and eventually the library faculty need to accomplish less work for stock confirmation Internet. IoT will also help in better inventory management (stock verification) as it will be easy to locate misplaced books.

Smart digital shelve

Smart digital shelves may be able to promote the contents based on users borrowing records and search history; it can also track the movement of the available resources within and outside the library. IoT through its applications allows its users not just to have the virtual visit through the

library on their cell phones, but also to keep and track the accessibility of the book on the separate retires or check the other asset accessibility notwithstanding the area or any place they are.

Users' orientation

Information literacy or orientation is offered to fresh users of the library to educate them about the library, its resources and services. IoT may help libraries in providing self guided virtual tour of the library. Libraries having setup beacons like wireless devices at various sections of the library, when users visit the particular section, their mobile phone will play a video or audio explaining more about that section and how one can get maximum benefit out of it. It may even provide enriched experience of special collection such as manuscripts by providing digital format of it on their mobile phones as physical access to such resources is always restricted.

Selected dissemination of information services

IoT can use patrons' data to suggest selected recommendations, using real time data, based on the history of their borrowings and activities. When a researcher searching a database for resources on topic/s of his or her interest, it may suggest other resources, which would be of interest to such user. Even when a user visit the library next time or is he or she is close to the library, IoT would be able to inform the user about the new arrivals in his or her area of interest or about the availability of a book on loan, which he or she was looking for during his/her earlier visit.

Current awareness services

IoT can provide the library users with location based services. If a user having created his favourite list on the library catalogue using his or her account from home or office, walking in to the library with IoT enabled mobile devices, they will be able to get directions for stacks, where favourite books have been shelved and also would be able to help him or her to know interesting titles available on the topic and status of checked out books. It may also enable libraries to provide status of availability of reading rooms, discussion rooms, printers, scanners, computers etc (Pujar and Satyanarayana, 2016), by displaying the peak and non peak hours of their usage on library website for users to check on their library mobile app.

Cost saving

Librarians provide general access for its numerous users through only one subscription platform instead of purchasing many copies of the physical materials for all users. Staff and students do not need to carry heavy books around or buy books and journals for their personal use as the library resources are accessible on their smart devices.

CONCLUSION

It is incontestable that technological advancement especially IoT has brought about a notable, unequivocal, remarkable positive water shell on the overall service delivery in academic libraries with special reference to how libraries and information centres generate, process, store and disseminate information. IoT has numerous features that could be used to enhance library service delivery if properly implemented. It could enhance effectiveness and efficiency in form of value addition to library and information resources and services. It is advisable for the librarians to learn this new technology from those that have effectively applied it to their operations and services to know its pros and cons particularly how it affects libraries. Despite the enormous benefit of the IoT, the full adoption of the system might be a little bit of a mirage in Nigerian libraries due to the fact many library are battling with maintenance issues. For this to take full shape, government at all levels must support the efforts of the libraries to collectively navigate the digital journey towards having the desired Smart libraries in the country.

Challenges/ Demerits of using IoT in academic libraries

- Security/ privacy issues
- Cost of deployment (design, customization and Maintenance)
- Technical know-how
- Lack of standardization
- Problem of infrastructural facilities
- issues of support for mobility
- issues with new network traffic patterns to be handled
- Erratic power supply as a result of high cost of maintaining alternate power supply

Recommendations

The following recommendations are made in the light of the paper.

1. Issues that border on security of users while sharing data with third party must be squarely addressed to forestall espionage of sensitive data. Thus, librarians must collaborate with IoT experts to have a more secured IoT future.
2. Librarians must ensure that they obtain a digital certificate for the IoT if they care to work with more secured data.
3. All academic libraries must embark on necessary requirement gathering statistics to ascertain the cost implication of starting, implementing and sustaining IoT in their organisations.
4. Staff should be given full support to go for in-service training so as to become proficient and versatile in the use of IoT for service delivery in their libraries.
5. Automation of academic libraries from initial stage to completion should be pursued with all figures to pave way for standardization through the adoption and sustainability of innovative technologies such as IoT in Nigerian libraries.
6. Infrastructural facilities such as stable power supply in all academic libraries must be provided and sustained uninterruptedly.

- Librarians must planning properly to provide effective Internet connection to tackle the issues with new network traffic patterns.

7. Libraries must put in place an effective and durable power back up to avoid incessant black out in the library service areas.

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PROVISION OF ACADEMIC LIBRARY SERVICES IN THE WAKE OF COVID-19: STUDENTS' PERSPECTIVES

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Abstract
Academic libraries play a significant role in supporting the learning and teaching activities of tertiary institutions by giving access to information and knowledge. However, the incidence of the COVID-19 pandemic has brought with it numerous challenges on the provision of library services and also greatly impacted their mode of operations. Hence, this study sought to explore how Botswana academic libraries redesigned their services to combat COVID-19 and the obstacles they faced in service delivery. The study utilized an online survey tool to collect data from 103 tertiary students in Botswana. The findings established that libraries are using various social media platforms, video conferencing tools, email and library websites to provide library services during the pandemic. Services offered include; virtual library tours and tutorials, ask the librarian, document delivery by scanning and online chat services. However, access to physical books is limited due to lack of provision of curbside pick-up services, outdoor reading tent, and book drop through courier services, photocopying and binding. Pertaining to challenges, the following were established: internet problems, low bandwidth, lack of librarians' readiness to provide digital services, lack of technological skills, technological trauma, inadequate reading space, inadequate ICT infrastructure, lack of/delayed response by librarians, complexity of the online environment, outdated information, unavailable/limited digital resources and financial constraints. The key recommendations arising from the study is that Botswana academic libraries need to improve their ICT infrastructure, expand the library space, provide training for both patrons and librarians, conduct user studies and increase the scope of the library materials. In addition, there is need to go beyond simple technology and employ advanced technologies such as virtual reality, augmented reality, Chatbots and drones. Further research needs to be conducted on academic libraries' readiness to undergo digital transformation.

Keywords: Botswana, Academic libraries, Challenges, Coronavirus (COVID-19), Virtual Services, Pandemic.

1. Introduction

The incidence of the COVID-19 pandemic has brought with it numerous challenges on the provision of library services and also greatly impacted their mode of operations. Many libraries had to shift from traditional methods to digital platforms with the intention of providing adequate remote services to the users. In the same light, the Fourth Industrial Revolution (4IR) has ushered in opportunities for librarians to improve library services and sail through the pandemic

by maximizing artificial intelligence, Internet of Things and Block chain technologies. As alluded by Dadhe and Dubey (2020, p.2), "the suspension of in-person services and loss of access to physical collections at the [Technological Institutions of India] libraries has left the students, faculty and library professionals with consideration of adopting the technology which is the only way out to resilience the challenging time." Despite these changes in libraries, there is lack of quantitative data on how academic libraries are coping during the pandemic, especially in Botswana. There is information gap regarding this phenomenon. Hence, this study sought to explore how Botswana academic libraries redesigned their services to combat COVID-19 and the obstacles they faced in service delivery.

2. Objectives of the study

The main purpose of the study sought to explore how Botswana academic libraries redesigned their services to combat COVID-19 and the obstacles they faced in service delivery. As a result, the specific objectives of this study are to:

1. Explore the types of services offered by academic libraries during the pandemic.
2. Find out the tools/technologies employed by academic libraries to continue service delivery during the pandemic.
3. Establish the challenges faced by academic libraries during the covid 19 outbreak.

3. LITERATURE REVIEW

Governments worldwide imposed a closure on the doors of academics because students' health is of utmost priority. As cited by Ewen (2020, para 6), Fletcher Durant, Director of Conservation and Preservation at the University of Florida's George A. Smathers Libraries, stated that "libraries could provide a risk vector for the spread of the disease, which, beyond the direct health impacts, could reduce the public trust in libraries". This therefore, forces libraries to remain closed until the risk of public infection is eliminated. However, this is not practical as the mission and goals of libraries will be thwarted. To fulfill their mission, libraries must put effort in reconciling the public health requirements of COVID-19 with library services. Consequently, Ortega-Martínez et al., (2021) noted that libraries have implemented plans and programs as part

of the transition process from analog to digital format with the main goal of improving user safety and containment of the SARS-CoV-2 virus.

3.1 Library Strategies During the Pandemic

According to Ma (2020, p. 324), "COVID-19 provides a unique opportunity for academic librarians to rethink their key roles and core values in supporting teaching and learning of their institutions during this very challenging time". Thus, most libraries have resorted to limiting physical access to books, computers, chairs and desks (Jones, 2020). In Italy, Tammaro (2020) established that, libraries reacted to the pandemic by (1) guaranteeing traditional services such as loan, interlibrary loan, cataloging, and reference services; (2) extended loan period; (3) home delivery of loans; (3) online registration to the library; and (4) improved interlibrary loan services.. In addition, literature revealed that libraries in the United States of America (USA) maintained services through: curbside checkout of materials, document delivery services, virtual/digital reference services (e.g. User query services through LibAnswers), equipment/laptop lending, course materials reserve, book drop through courier services, and offering webinars on health related topics (Ayeni, Agbaje, & Tippler, 2021; See, 2020; Tolppanen, 2021; Weeks et al., 2020; Yu & Mani, 2020). Dadhe and Dubey (2020) also revealed that the Indian Institute of Technology (IIT), Gandhi Nagar took special effort to make the print collection available to its users by; (1) providing a link to a list of course reading materials; and, (2) introducing document delivery through sending scanned copies. Last but not least, Murphy et al., (2021) also revealed some interesting initiatives implemented at the University of Calgary in Canada. These include: online work teams, online tutorials, digital collections agreements, virtual 360-degree tours, Outdoor tent, computer workstation booking, contactless pickup, Reading List Tool, myLibrarian, and the online library chat service. Murphy et al., (2021) further noted that the virtual 360-degree tours will be used to present art gallery exhibitions and virtual book displays in the future.

3.2 Tools and Technologies Used by Libraries

Apart from re-invention of the library services mentioned above, libraries are adopting various technologies to enhance service delivery and abide by COVID-19 protocols. Table 1, presents some of the technologies adopted by different libraries. The findings from literature on table 1 show that social media platforms are the most commonly adopted technology of communicating and rendering library services to patrons.

Table 1: ***Tools and Technologies Adopted during COVID-19 by Different Libraries***

Author	Country	Type of Library	Technologies/Media/tools
(Carbery, et al., 2020)	Ireland	Case studies from different types of libraries	3D printer, Zoom, Microsoft Teams
(Guo, et al., 2021)	China	Academic library	Mobile library app, Email, WeChat, Microblog, Chaoxing Learning Link, Telephone
(Howes, Ferrell, Pettys, & Roloff, 2021)	USA	Medical Library	WebEx, Zoom, EndNote Microsoft Teams, Camtasia ConnectWise
(Ishtiaq, Sehar, & Shahid, 2020)	Pakistan	Academic libraries	Facebook, Gmail, Google Plus, Facebook, Instagram, YouTube, LinkedIn, messenger.
(Ma, 2020)	Hong Kong	Case studies from different types of libraries	Zoom, RefWorks, Repository, EndNote,
(Mehta & Wang, 2020)	USA	Academic library	Zoom, Blackboard, Microsoft Teams, LibChat and LibAnswers
(Murphy, Lewis, McKillop, & Stoeckle, 2021)	Canada	Academic library	Vuze+ camera, LibApps platform, ThingLink platform, Zoom, Frequently Asked Questions (FAQs), YouTube, Microsoft Teams, Desire2Learn (the university's content management system), QuickTime software, iMovie, Final Cut Pro
(Neog, 2020)	India	Academic library	Facebook, Twitter, Blog, WhatsApp
(Omeluzor, Nwaomah,	Nigeria	University libraries	WhatsApp, Twitter, Ask a Librarian, Frequently Asked Questions (FAQs),

Molokw, & Sambo, 2021)			library blog, LinkedIn, repositories, ResearchGate, Mendeley, ORCiD, Academia.edu, Kudos, Research Square, email, mobile technologies
(Tsekea & Chigwada, 2021)	Zimbabwe	Academic libraries	Skype, Facebook, WhatsApp, Twitter, YouTube
(Winata, Fadelina, & Basuki, 2021)	Indonesia	Academic libraries	YouTube, Dropbox, Facebook, a computer circulation desk, Smartphone, Instagram Twitter.

3.3 Library Challenges During the Pandemic

Libraries, especially in developing countries have always had unresolved problems which thwarted their fundamental reasons for existence (Tammaro, 2020). COVID-19 dictates the need for digital transformation of library services. However, this has always been the biggest challenge especially in Africa; where digital divide, lack of computer literacy skills, low bandwidth, network problems, power cuts and inadequate funds are eminent (Tsekea & Chigwada, 2021; Winata, Fadelina, & Basuki, 2021). Literature shows that, despite the adoption of various information dissemination technologies; reaching remote users is not easy for libraries as it requires a robust technological infrastructure and changing staff mindset (Panda et al., 2021). Panda et al., (2021) and Balagopal, Vijayan, and Joseph (2021) revealed that Indian libraries encountered the following challenges; financial crisis, lack of technical skill, pressure of a deadline and the unwillingness of the competent authority to implement remote access services. These challenges were also alluded to by Tammaro (2020), who also added that copyright issues were a big challenge to digitization and sharing of scanned documents. Other challenges identified in the literature include: (1) none subscription for data for librarians to work from home, (2) negative attitude by the community in using technology, (3) lack of private working space at home, (4) collaboration challenges, (5) a wide spectrum of documents are not available digitally, (6) difficulty in adjusting to online mode of information provision, (7) lack of policy guidelines, and (8) challenging digitization process for non-born digital resources (Chakraborty & Jana, 2021; Kasa & Yusuf, 2020; Neog, 2020; Omeluzor et. al., 2021; Pokorna et al., 2020).

4. RESEARCH METHODOLOGY

This study adopted both quantitative and qualitative research approaches. Data was collected from 103 tertiary students in Botswana, using an online survey tool (Google forms). The use of online surveys have become more prominent in the 4IR era especially now with the advent of COVID-19. This method has been employed successfully by numerous researchers such as Malabanan, Galicia, and Navarro, (2021), Tolppanen (2021), and Zhou (2021). Snowballing sampling technique was used to disseminate the online survey. Pertaining to data analysis, quantitative data was exported from Google Forms into Microsoft Excel for formulation of charts and frequency tables. Whereas qualitative data was analyzed manually and categorized into themes.

5. RESEARCH FINDINGS

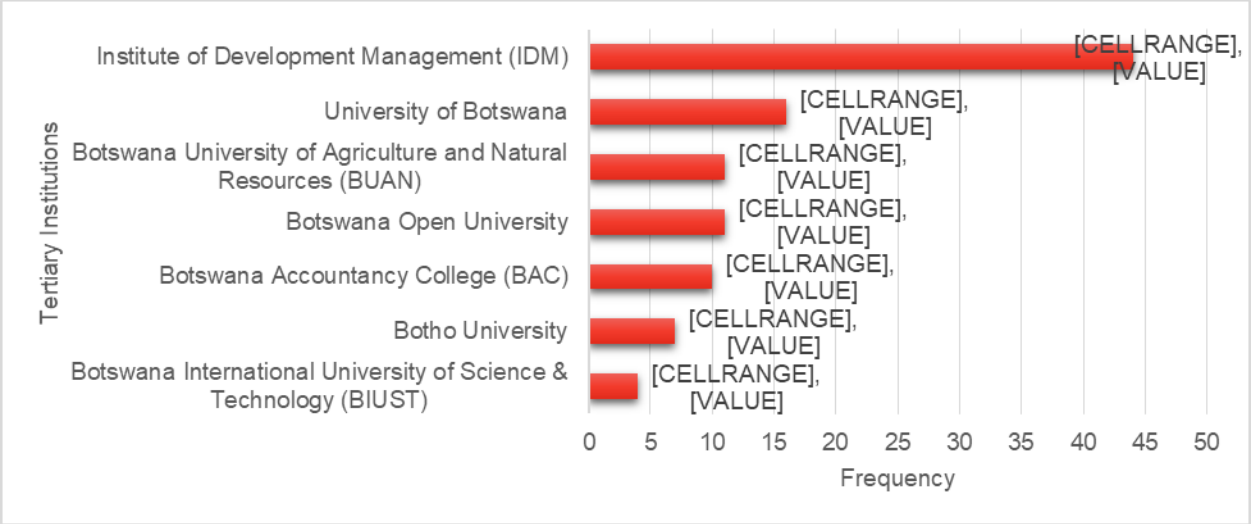
This section presents data findings in two sections; demographic details and empirical findings.

5.1 Demographic Details

Figure 1 presents the distribution of respondents according to their institutional affiliation. The study attracted responses from seven (7) tertiary institutions in Botswana as follows; Institute of Development Management (n=44, 43%), University of Botswana (n=16, 16%), Botswana University of Agriculture and Natural Resources (n-11, 11%), Botswana Open University (n=11, 11%), Botswana Accountancy College (n=10, 10%), Botho University (n=7, 7%) and Botswana International University of Science & Technology (n=4, 4%). As can be seen from the findings, majority of the respondents were from the Institute of Development Management (IDM). This could be as a result of snowballing technique employed in this study. Once the link has been shared with the initial participants, the researcher will no longer have absolute control of how many people will be shared with and where will the respondents come from. Hence, data collection via the online snowballing technique is at the mercy of the first participants to be contacted and it is also dependent on their circle of friends and their willingness to further share the link to other students. On the other hand, this finding could also be as a result of the initial

number (10 student) of participants in IDM who were first given the link to share with their colleagues.

Figure 3: ***Distribution of Respondents by Tertiary Institutions (n=103)***



Source: Field data, 2022

In terms of respondents' qualification, Table 2 shows that majority of the respondents are studying to attain a Bachelor's Degree (n=51 53%), followed by those doing a Diploma (n=31, 32%) and certificate (n=13, 14%). Only one (1%) respondent indicated that he/she are a postgraduate student. Concerning gender distribution, females (n=71, 69%) dominated the study more than males (n=32, 31%). Pertaining to Age distribution (see Table 2), most of the respondents are in the youth category 18-24 years (n=45, 44%). They are then followed by those within the 35-44 (21, 20%), 45 years and above (n=22, 21%), and lastly 25-34 years (n=14, 14%). This findings shows that the sample is representative of all levels of studying and levels of understanding according to age, qualification and their year of study. This shows that the library is not just for a specific group of people but it caters for all types of students with different needs at different levels.

Table 2: ***Respondents Characteristics***

	Frequency	Percentage
Qualification (n=96)		
Certificate	13	14%
Diploma	31	32%

Bachelor's Degree	51	53%
Postgraduate	1	1%
Gender (n=103)		
Female	71	69%
Male	32	31%
Age (n=103)		
18-24	45	44%
25-34	14	14%
35-44	21	20%
45 and above	22	21%

Source: Field data, 2022

To further understand the respondents' characteristics, they were asked to indicate their level of computer literacy as this is key for the 4IR era and service access during the Covid-19 pandemic. As shown on Figure 2, majority of the study respondents have basic (n=56, 54%) computer skills, followed by 31% (n=32) of respondents at the intermediate level and only 15% (n=15) of the respondents who indicated that they are proficient in computer usage.

Figure 4: ***Level of Computer Literacy (n=103)***



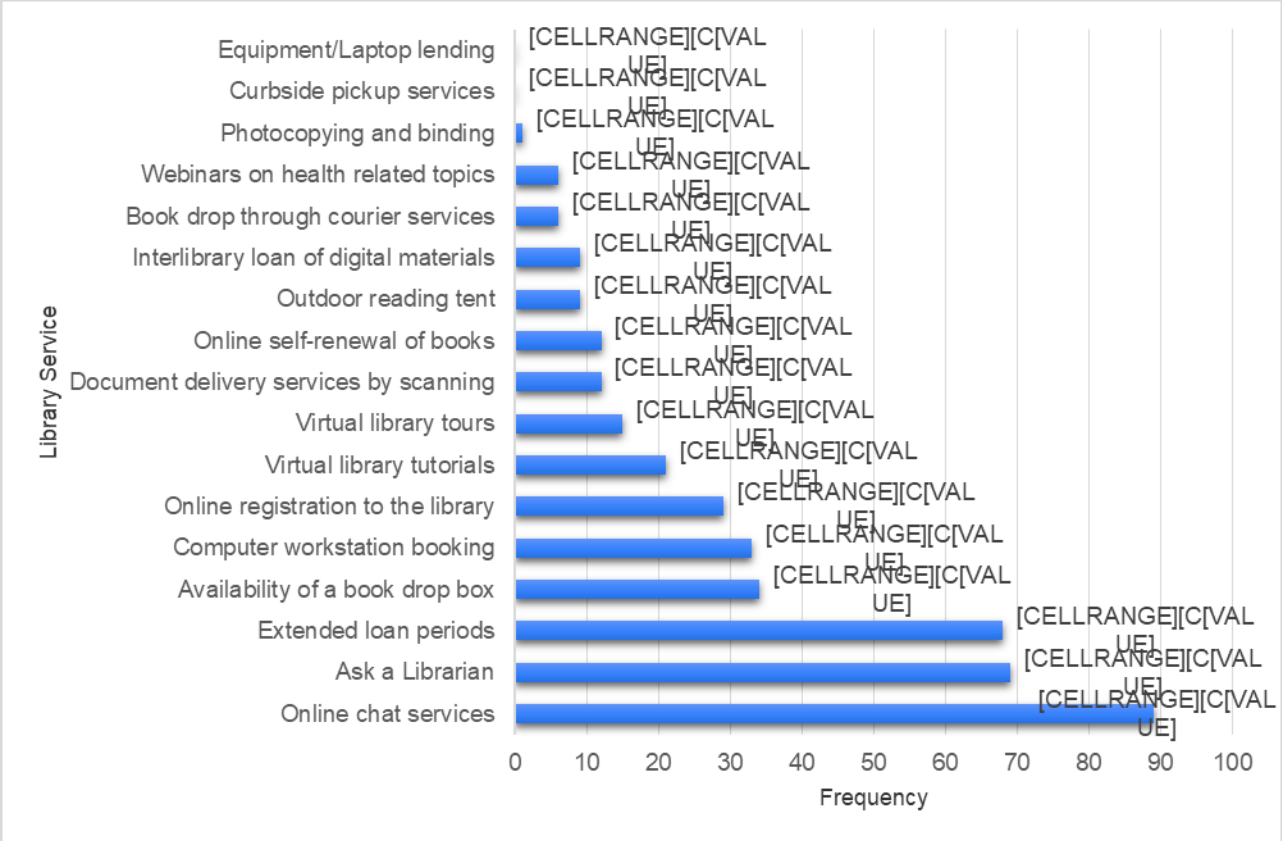
Source: Field data, 2022

5.2 Empirical Findings

This section aims to address the study objectives. Figure 3 presents the various library services offered in Botswana Tertiary Institutions. The findings show that the most prevailing services were online chat services (n=89, 91%), ask a librarian (n=69, 70%) and extended loan periods (n=68, 69%). These are then followed by availability of book drop box (n=34, 35%), computer

workstation booking (n=33, 34%), online registration to the library (n=30, 29%), online chat services (n=26, 25%) and virtual library tutorials (n=21, 21%). Other services were alluded to by a small number of respondents. In addition, none of the respondents alluded to the availability of equipment/laptop lending and curbside pick-up services.

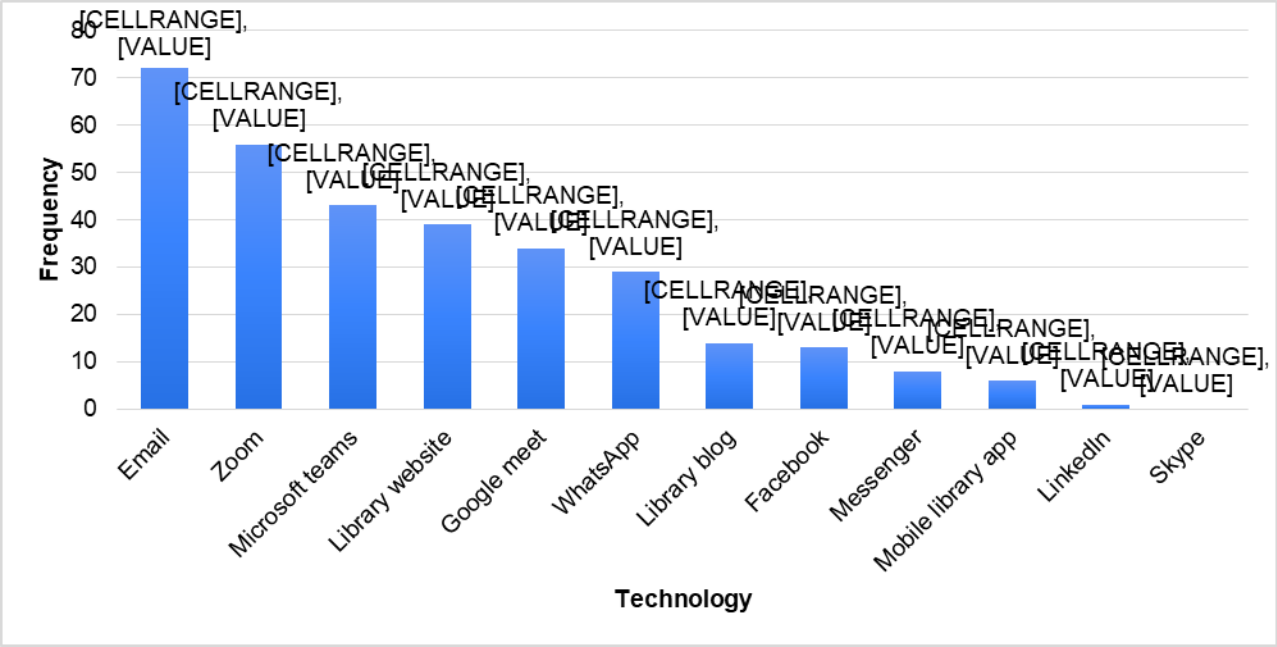
Figure 5: ***Library Services During the Pandemic (n=98)***



Source: Field data, 2022

In relation to technologies used for service delivery, it is evident from the findings (Figure 4) that academic libraries in Botswana are using Email (n=72, 71%), Zoom (n=56, 55%), Microsoft teams (n=43, 43%), Library website (n=39, 39%), Google meet (n=34%, 34) and WhatsApp (n=29, 29%). The rest of the tools were attracted insignificant responses.

Figure 6: ***Tools/Technologies Used to Interact with Librarians during the Pandemic (n=101)***



Source: Field data, 2022

To further understand the usage of the indicated technologies respondents were asked to explain how they are using them. Their responses are captured in Table 3 according to the subjective themes deduced by the researcher from respondents' explanations. .

Table 3: ***Qualitative Analysis on Usage of Technologies Presented in Figure 5 (n=78)***

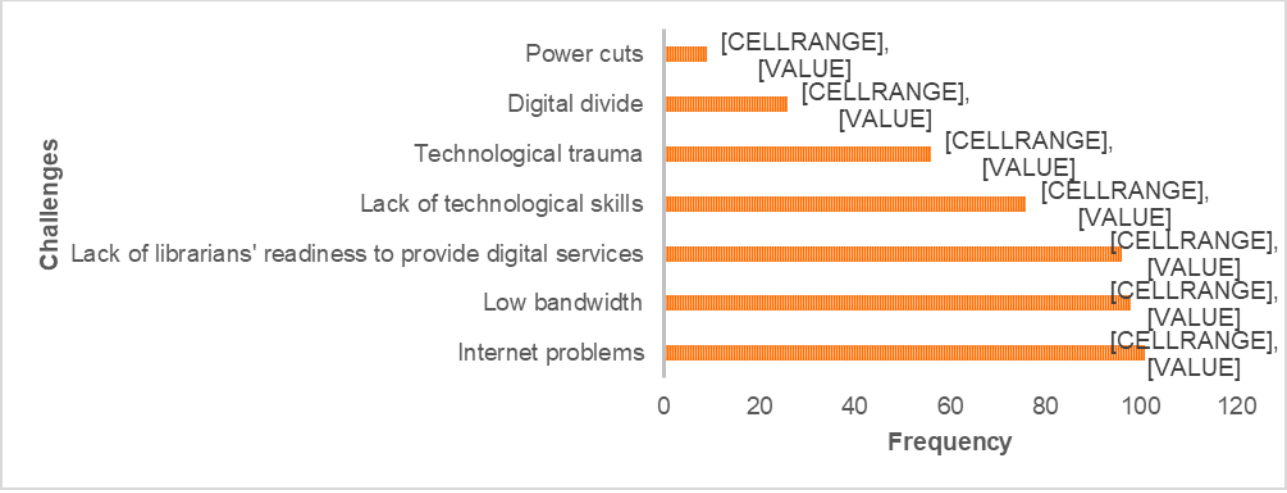
Theme	Supporting statement
General Inquiries	"I use WhatsApp to ask if there is space in the library [since] we are not allowed in numbers in the library, only a few number is allowed" "Sometimes I use WhatsApp or email to inquire about library opening hours especially during the lockdown as there used to be a lot of changes in library operations"
Material Requests	"If I need to borrow a book I get in contact with [the librarian] via email, they will then facilitate the borrowing process and send me an electronic book since some can't be accessed outside school network" "Requesting digital books [through the] library website, for a certain period of time then it disappears automatically when its loan period is due."
Assignment assistance	"When am stuck with my assignment or I cannot find relevant sources to solve the question, I contact the librarian through school email to get help on how to find or where to get the sources" "If is an assignment given to me, I write the question and send it via email, so that they can give me books which I can use for my research, after the librarians found that book they email it to me. I have to download and proceed with my assignment." "We use Microsoft teams to ask librarians for help with assignments"

Self-service	"Through the library portal, we can renew our books by ourselves" "I use the Library blog/website to access academic resources like virtual text books and to check what kind of books are available online. Although accessing it isn't as simple as I'd like it to be."
Virtual Library Tours and tutorials	"We are able to interact with the librarians via the Microsoft teams through the video conferencing platform it offers" "We use Google meet [which] works more like Zoom whereby there's an exchange of information literacy skills from librarians to students"
Remote Access	"They provided an SSH connection tool that creates a virtual computer on the library server, this enables us to access the library from home" "Log into the school website and access eBooks offered by our library, and we are given passwords for each eBook available online from our school."
Current awareness program	"On our library website there is current information on COVID-19 statistics and other related announcements on precautions. "I visit the library website for updates, as there is always a list of new arrivals for eBooks which are availed to students for free"

Source: Field data, 2022

Pertaining to the challenges faced by students in accessing library services during Covd-19, findings (see Figure 5) show that the most prevalent challenges are internet problems (n=101, 98%), low bandwidth (n=98,95%), lack of librarians readiness to provide digital services (n=96, 93%), lack of technological skills (n=76, 74%) and technological trauma (n=56, 54%). Digital divide (n=26, 25%) and power cuts (n=9, 9%) were the least challenges mentioned by respondents.

Figure 7: ***Challenges Faced by Students in Accessing Library Services during the Pandemic (n=103)***



Source: Field data, 2022

6. DISCUSSION

This section provides a discussion on findings based on the objectives of this study.

6.1 Types of Services Offered by Academic Libraries During the Pandemic

From the study findings, it is praiseworthy that there are traces of provision of virtual reference services to continue with service delivery during the pandemic. These services include; virtual library tours and tutorials, ask the librarian, document delivery by scanning and online chat services. Generally, the responses on the types of services offered by academic libraries were very low. Only three services; online chat services, ask a librarian, and extended loan periods had responses above 50%. This finding is disheartening as it implies the likelihood of limited library service provision during the pandemic. This finding could be as a result of the fact that colleges and universities in Botswana were under total lockdown and movement was not allowed without permits. Hence, less researchers likely visited the library. In addition, the study findings depicts that access to physical materials were limited as none of the respondents alluded to availability of curbside pick-up services nor equipment/laptop lending. In addition, insignificant responses were attained for outdoor reading tent, book drop through courier services, photocopying and binding. Absence of these services reduces access to physical books and this can be traumatizing to some students when they are unable to access core texts for their modules. The above findings are contrary to research findings by Mashiyane and Molepo (2021) in South Africa, Ewen (2020) in the USA and Murphy et al. (2021) in Canada. These authors established that libraries have managed to maitain contact with their patrons by continuing to provide physical access to library materials during the pandemic. This helps to reduce frustrations on library users who are not confident with the online environment. The outdoor reading tent is an excellent initiative for increasing the libray space.

6.2 Tools/Technologies Used for Library Service Delivery During the Pandemic

The study findings revealed that academic libraries in Botswana are operating in the Web 2.0 era. This is evidenced by wide adoption of social media tools, video conferencing platforms, Email and websites These findings are consistent with research by Ishtiaq, Sehar, and Shahid

(2020) in Pakistan, Neog (2020) in India, Omeluzor et al. (2021) in Nigeria and Tsekea and Chigwada (2021) in Zimbabwe. However, the above findings are contrary to a study by Rafiq et al. (2021) who established that the university portal and other social media tools were less used communication tools during the pandemic in Pakistan. As depicted in Table 3, qualitative responses indicate that the above-mentioned technologies were used for the following purposes; (1) Inquiries- such as asking for availability of space in the library; (2) Request for materials-like Ebooks; (3) Assignment assistance-such as receiving email links for sources related to the assignment; (4) Self-service- such as online self-renewal of books; (5) Virtual library tours and tutorials-including trainings via Zoom or Microsoft Teams; (6) Remote Access- through SSH connection tools; and (7) Current Awareness Program- use of email and library website/blog.

In as much as it is appreciated that academic libraries are making effort to implement some technologies to facilitate virtual services; it is still important to highlight that these libraries are lagging behind in their technological revolution. This is so as the current tools being used are nowhere near to being adequate for digital transformation of academic libraries in Botswana; if they are to remain relevant and achieve their mission in the Fourth Industrial Revolution (4IR) era. According to Bhattacharya and Momaya (2021, p.1397) "the active use of digitalization, automation and the widening use of information and communications technology (ICT) across industries, via the use of technologies of cyber-physical systems, Internet of Things (IoT), cloud computing and cognitive computing, is described as 4IR". In this current study there is no evidence of adoption of such complex technologies in academic library services; despite the fact that technologies have the ability to transform libraries and help them achieve their mission during challenges such as the Covid-19 pandemic. Study respondents have lamented about the inadequaecy of virtual tours in their library. Respondents explained that, the use of Zoom or Google meet to induct students about the library facilities is not enough. This can only imply that libraries need to employ 3D video technologies. It is therefore, important to note that technologies such three-dimensional (3D) scanning, Chatbots, drones, virtual reality, augmented reality and mixed reality have a potential for extensive use in the library environment (Frost et al., 2020; Massis, 2019). For example, drones can be used for document delivery to patrons (Saloi, 2021; The European Community Psychology Association, 2021). Libraries which ignore

the presence of 4IR would soon be obsolete, and there will be no hope of catching up later. This is a wakeup call for Botswana academic libraries.

6.3 Challenges Faced by Academic Libraries During the Covid-19

The study findings revealed the following challenges are eminent in Botswana tertiary institutions; internet problems, low bandwidth, lack of librarians readiness to provide digital services, lack of technological skills and technological trauma. These challenges are in sync with other studies such as Rafiq et al. (2021) and Mathabela (2021). In addition, qualitative excerpts from the respondents have also supported the challenges mentioned above. The qualitative responses on challenges were categorized as follows:

a. ***Inadequate reading space*****:** some of the study respondents lamented that the library space is inadequate. This drastically reduces the number of patrons to use library facilities (such as chairs and tables) at a given time. This is evidenced by one of the respondent who mentioned that "*Covid-19 has put a strain in using the library to study. The space is very limited hence we are given a limited amount of time to use the library facilities. So I personally think this has demoralized students from using the library.*"

b. ***Inadequate ICT infrastructure:*** Technological resources have always been a problem in Botswana. The study participants mentioned that "*the school has few accessible computers, hence it is difficult for students without smart phones to access electronic books or other virtual library services even when they are on campus in their dorms.*" Most participants lamented of slow network, low bandwidth and that the libraries have old computers which take long to respond. Hence, they cannot access the required information due to limited time given to each user per computer.

c. ***Lack of/delayed response by librarians:*** some respondents lamented that librarians are slow to respond to their online queries. While others noted that the librarians seem not to be keen in helping users on the virtual platform. Some supporting statements were as follows: (1) "*Unanswered telephone calls*"; (2) "*during the lockdown it was really difficult and frustrating for me to get the relevant materials as I would send emails to librarians but they would not respond.*" and (3) "*Librarians do not sound confident when providing online tutorials.*" This is evidence to the challenge mentioned above, about lack of librarians'

readiness to provide digital services. This is the reason why Martzoukou (2021) averred that with increased adoption of technologies to curb the pandemic, librarians were forced to redefine their roles and re-examine their skills; as they needed to be on the fore front and provide digital support to patrons. Hence, training in information technologies has become a necessity for both librarians and patrons to be ready and willing to utilize online services. Training may help curb the challenge of librarians not being active on the virtual environment. On the other hand, it is worth noting that lack of adequate resources such as provision of laptops for librarians to carry home maybe the reason why librarians could not provide timely services to patrons. Thus, this calls for assessment of institutional readiness for digital transformation in the 4IR era.

d. ***Complexity of the online environment:*** 74% (n=76) of the respondents indicated that they face challenges with accessing library services due to lack of technological skills. This is likely to explain why respondents felt that the online environment is complex. Some participant have mentioned that (1) "*I find it hard to use the academic platforms when doing assignments because they always need information that is complicated and hard to understand*" and "*It is difficult to download different formats of online sources*"; The above narrations shows the need for more training of library users about the virtual library platform.
e. ***Outdated information***: the issue of outdated information on the virtual platform was also raised as a problem. Respondents explained that the library website is rarely updated and they cannot rely on it for any current news such as updates on Covid-19 information. One of the participants mentioned that "*It is quite tedious to access the school library online services. And the blog/websites are not consistently updated*."
f. ***Unavailable/limited digital resources:*** The study participants lamented that the scope of digital materials is very limited as some disciplines are not covered. Another respondent mentioned that "*Some databases do not work despite the school having subscribed to them.*" These challenges compel students to visit the library and access physical materials as they aren't many options on the virtual library. Panda et al., (2021) reports that publishers saw COVID-19 as an opportunity for making profit. Publishers saw the rise in demand for e-resources, hence, increased the subscription rates. With limited budget, this hindered

librarians to fulfill their duties in the virtual environment. Hence, leading to limited digital materials.

g. ***Financial Constraints:*** Some of the participants lamented that virtual access to library materials is challenging due to the fact that they need money to subscribe to data bundles while at home. They explained that this has been a big challenge in them completing their assignments during the lockdown as they could not afford the bundles and some were staying in areas where they cannot access Wi-Fi. Nonetheless, it is praiseworthy that some students alluded that their tertiary institution has provided all students with be-mobile sim cards with data bundles that are recharged on a monthly basis.

7. CONCLUSION

The study has established that Botswana academic libraries are putting effort in providing various virtual services through different technological platforms such as WhatsApp, Google meet, Facebook, email, Zoom, Microsoft teams, and library websites/blogs. The study also revealed that access to physical books was limited. Pertaining to challenges, the following were mentioned: internet problems, low bandwidth, lack of librarians' readiness to provide digital services, lack of technological skills, technological trauma, inadequate reading space, inadequate ICT infrastructure, lack of/delayed response by librarians, complexity of the online environment, outdated information, unavailable/limited digital resources and financial constraints. In conclusion, Botswana academic libraries have put effort in ensuring continuation of library services during the pandemic. Nonetheless this is not enough as none of the libraries have ventured into implementation of advanced technologies offered by the 4IR era. Generally, the study results implicate the need for tertiary institutions to ensure sustainability of library services during and beyond the pandemic by sailing through the wave of 4IR technologies. In addition, there is need for further research to determine library readiness for digital transformation. The following section highlights various measures that would respond to the ever changing landscape of research requirements and user demands.

8. RECOMMENDATIONS

Based on the findings of this study, the researcher makes the following recommendations together with what was suggested by the study respondents:

a. ***Improve the ICT infrastructure:*** there is need for implementation of adequate and advanced ICT infrastructure that facilitates online operations. Some respondents have suggested the libraries to increase the number of computers and power sockets, and frequently maintain and repair library computers.

b. ***Expansion of library space:*** with the Covid-19 requirements to maintain social distance a larger reading space is required. Therefore, it is recommended that academic libraries should redesign library spaces and increase its capacity. Strategies such as outdoor reading tent can be employed to increase the number of users who value studying in library or community spaces. This will bring closure and mental stability for patrons who are depressed with working indoors.

c. ***Student training and awareness raising:*** the issue of lack of technological skills, technological trauma and lack of librarians' readiness were raised as challenges. Most participants have alluded to the fact they sometimes fail to complete their assignments due to lack of skills in retrieving the online data. Thus, training will raise awareness on how to operate in the virtual environment.

d. ***Increase library materials and the scope of subjects covered:*** it is important for libraries to constantly review their acquisition policy and try to cater for the digital collection as much as they do for the physical collection. Improving inter-library loan services can also help to this effect.

e. ***Conduct User studies:*** to ensure satisfactory customer service, the librarians need to know their clients' needs and formulate customized services and this will also enable them to implement selective information dissemination.

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INFORMATION RETRIEVAL CHALLENGES AT THE UNIVERSITY OF BOTSWANA LIBRARY IN THE 4IR ERA

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Abstract

The era of the fourth industrial revolution does not have room for tardiness. It requires speed and promptness in getting things done including document delivery for use. Taking into account the increasing influx of information resources and the importance of accessibility to them, it has become critical for libraries to strategise and expand accessibility in order to meet the demands and needs of information users promptly and effectively. The purpose of this study is to examine the difficulty of information retrieval at the University of Botswana Library. The study specifically aims to determine the standard requirements for quality records adopted, the compliance to the standard; and to find out the action that the University of Botswana Library Management takes to prevent non-conformity to quality records requirements. The effort to strategise and expand effective accessibility of information led to the need for standards awareness. Standards are meant to provide guidance on any procedure to achieve the expected outcome. Awareness and adoption of standards lead to effectiveness and achievement of goals. This study discussed information organization with respect to the role played by standards awareness at the University of Botswana Library (UBL). The study adopted interpretive research paradigm. Qualitative research approach was therefore employed where semi-structured interview and observation were used as data collection instruments. The technical crew members targeted and interviewed from the UBL were 19, and response rate of 100% was returned. The findings established standard requirements, awareness levels and modes of enforcing compliance. The study revealed Online Computer Library Center (OCLC), Dewey Decimal Classification (DDC) Scheme and Resource Description and Access (RDA) as some of the standards requirements adopted by the University of Botswana Library. Not many people were aware of standard requirements as shown by 4 (26.7%) respondents who indicated awareness to standard requirements, in comparison to the 11 (73.3%) who asserted unawareness. There are initiatives developed by UBL to ensure application of standards.

A search of extant literature revealed no study on the subject matter has been carried out and this makes this study assume originality. Recommendations produced from the findings are considered possible solutions to information organization challenges in libraries.

INTRODUCTION

The era of the fourth industrial revolution does not have room for tardiness and lethargy in information dispensation. It requires speed and rapidity in getting things done. Libraries are expected to ensure promptness in information retrieval and document delivery system irrespective of the enormity of the collection they might have. An academic library function is a support base for learning, teaching, and research. In creating a knowledge based society it acquires variety of information resources and most importantly facilitates access to the collection. Taking into account the growing rate of information materials, information needs and the pressure for information provision, libraries are expected to intensify their effort to satisfy the growing need. Therefore, it is imperative not only to acquire the information materials, but also to have the information appropriately organized to facilitate effective and prompt accessibility, especially in the days of the fourth industrial revolution.

Onwuchekwa (2012) defines information organization as a process where information resources are thoroughly described, identifying entities such as the name of the author, title and subjects which are deemed important components used to trace from the library database where to locate the actual items. Habib-ur-Rehman et al. (2017) argue that information organization is about description of information resources to produce records that stand for a systematically arranged collection. The importance of information organization is equally emphasised by Glushko (2013), who states that organising information is all about friendly arrangement of information resources such that information seekers will easily access, retrieve and utilize them. Similarly George and Makwae (2016) reiterate that organized information resources facilitate order and maximize utilization of the collection. In contrast, George and Makwae (2016) argue that disorganized information works contrary to the good will of organized collection as it hinders retrieval and accessibility to information resources. Onwuchekwa (2012), has stated that the growth of information and the disorganized collections make it difficult for information seekers to find information. Some of the predominant challenges include allocation of incorrect classification of information resources, inadequate staff training and wrong capture of information.

This study has the fourth industrial revoloution in focus and investigates information organization with respect to the role played by standards awareness in organizing information at the University of Botswana Library (UBL). The study accedes to a statement asserted by Suárez (1992) that, quality in products or services is achieved through compliance to the set requirements. It affirms that the organization should ensure compliance to the set quality requirements in order to achieve the expected results of quality products or services. Whitehall (1992) further affirmed that it is critical to monitor and enforce compliance with the standards requirements to be able to achieve quality records.

STATEMENT OF THE PROBLEM

Information organization is a significant process in information provision (Idiegbeyan-Ose et al., 2016). Onwuchekwa (2012) confirms that the increasing information obligates libraries and other information distribution institutions to acknowledge the role played by organized information in facilitation of accessibility to information and promotion of utilization. However, there are challenges. Global gaps on information organization include spelling mistakes in catalogue records (Zatyko, 2017). Vasudev (2015) emphasised that an erroneous record is bad information to the user.Other authors have made observations of hiccups on information organisations in libraries. For instance, Johari and Zainab (2017) confirm that the information retrieval system of the University of Tenaga Library in Malaysia had inaccurate information. Laranjeiro, Soydemir and Bernardino (2015) who conducted a survey on data quality in the United States of America expressed how disappointed the users would be if they they were not able to find the information being sought.

Preliminary investigation conducted at the University of Botswana Library (UBL) which serves students, staff, affiliated institutions and the public at large, suggests that organisation of information resources was not hitch free culminating in frustration and disappointment for users. Some of the problems observed include **in**accurate information in the online public access catalogue (OPAC) about information resources held by the University of Botswana Library such as having a different call number allocated to an item from what is indicated to it in OPAC, while some e-books on OPAC were not accessible, other materials were misshelved making it difficult to locate them, etc. The various inadequacies traceable to information organization, the

gaps observed from the preliminary investigation and lack of previous study on information organization at the University of Botswana Library, join forces to provide the motivation and justification to make this study compelling. Crosby's Theory was adopted as the theoretical framework to guide the study.

LITERATURE REVIEW

For effective information provision, libraries ought to have standards to guide them to ensure production of quality results (Suárez, 1992). Suárez (1992) described standards as stipulated requirements which an organization needs and complies with in order to achieve the expected quality results. This is supported by Hsieh, Chang and Lu (2000) who state that quality control requirements need to be established and followed through out the business processes. Thapisa and Gamini (1999) also allude to the study on quality service recommending the setting of quality standards to meet users' information needs. Whitehall (1992) had argued that it is not just enough to have standards requirements; he emphasised on the need for the libraries to make themselves compatible and relevant to standards implementation by ensuring adequate training for effective implementation, and compliance monitoring. This is affirmed by Nero and He (2018) who echo the importance of training. The duo explained that it is a prerequisite for cataloguers to be adequately trained to prevent consequences that may result from non-conformity to quality standards such as errorneous bibliographic records, misinterpretation of information resources, incorrect subject and class number allocations and typographical errors. This appears to indicate that standards or standard requirements are quality management strategies through which an organization can fulfil its vision and mission effectively. Machara and Jain (2016) seem to suggest that standard requirements are not limited to services but goes even to the service providers. The duo acquiesce that strategies that a library can put in place for improvement of services include but not limited to adequate training, good working conditions, job promotions and availability of working tools.

Alluding to the importance of training, Nero and He (2018) indicate that some of the educational programmes include viewing Webinars, and training on current cataloguing requirements. The findings on the study conducted by Adebayo (2009) on quality assurance and the implication for

the management of university libraries in Nigeria, revealed that all the libraries had adopted Quality Assurance standards. Adebayo however noted with regret that the staff were not able to apply it because of inadequacy in training and lack of funds. These standards, according to Adebayo emphasise that students should be given information literacy to equip them with skills to locate information resources from the university libraries. Further, the standards require staff to be acquainted with what is happening in each library unit to ensure effective management and utilization of information resources. Furthermore, the standards expected reference and acquisitions librarians to have acquired qualifications of at least, a masters and doctorate levels for competitive service delivery. The staff also needs to have acquired varied knowledge and expertise to meet both the teaching and learning needs of the users.

While assessing modes of compliance to standards, Nero and He (2018) assert that cataloguers have to be well trained to effectively apply requirements from information organization standards such as the Online Computer Library Center (OCLC) database and the Library of Congress classification system. Similarly, in his study Adebayo (2009) notes that availability of working tools coupled with standards, form an important link in the facilitation of quality work. He observes that setting standards of quality and compliance are necessary ingredients that lead to the creation of accessible information resources.

OBJECTIVE OF THE STUDY

The objective of the study is to investigate the librarians' views on the challenges of information retrieval at the University of Botswana Library. Specifically, the study sought to:

1. Determine the standard requirements for processing and organising information information resources at the University of Botswana Library and the compliance to standards
2. Establish how the University of Botswana Library measures conformity to the standards
3. Determine the type of mistakes and errors made in organising information at the UBL
4. Find out the strategy that the University of Botswana Library Management put in place to prevent non-conformity to the standards

RESEARCH METHODOLOGY

A survey research design was employed to address the objectives of the study. The study adopted interpretivist research paradigm using qualitative approach. Data was collected through semi-structured interview of purposively selected 15 participants in the technical (cataloguing and classification) section and 4 participants in other departments who had constant interaction with the library users. The interview retained 100% response rate. Armed with a checklist, a weeklong participative observation was also employed in the cataloguing section to validate findings from the interview. The study primarily used thematic approach to analyse the collected data Ms-Excel was used to compute statistical analysis. NVIVO software was adopted for coding the data.

FINDINGS

The purposive driven sampling method used in the study was focused on a total of 19 participants. These include 1 (5.3%) member of the management, 3 (15.8%) classifiers, 1 (5.3%) manager (senior librarian), 2 (10.5%) reference librarians, 11 (57.9%) cataloguers and 1 (5.3%) participant from the Automation Unit. With ceaseless follow up the participants, the study returned a 100% response rate. Details are as presented in Table 1

Table 1: Interviewees response rates

		Frequency	Percent	Cumulative Percent
Valid	Management	1	5.3	5.3
	Classifiers	3	15.8	21.1
	Manager	1	5.3	26.4
	Reference Librarians	2	10.5	36.9
	Cataloguers	11	57.9	94.8
	Automation Unit	1	5.3	100.0
	Total	19	100.0	

Findings from the interview data and participative observation

The findings from the interview data and participative observation have been discussed relative to the research objectives.

The first objective of the study sought to determine the standard requirements for processing and organising information information resources at the University of Botswana Library and the compliance to the standard. In order to address this objective, some questions were raised. Respondents were asked whether they were aware of any policy for the attainment of quality records in the cataloguing process, that they should indicate its specific requirements (if yes), whether they (especially the age long cataloguers) were involved in its formulation and how they ensured compliance to the set requirements. Table 2 shows the response of interviewees concerning the issues raised.

Table 2: Standard Requirements awareness

Are you aware of a policy for attainment of quality records in the University of Botswana Library?

		Frequency	Percent	Cumulative Percent
Valid	No	11	73.3	73.3
	Yes	4	26.7	100.0
	Total	15	100.0	

From their reaction on staff awareness to standards requirements and compliance, the study noted that not many people were aware as only 4 (26.7%) respondents indicated awareness to the standard requirements. Majority of respondents (n = 11, 73.3%) proclaimed unawareness.

Underlining unawareness for standards, one respondent said *"there is no such policy".* The assertion was confirmed by another respondent who said *"I am not aware of a policy document in place".* The results seems to imply that 11 (73.3%) interviewees were not applying any quality standards for the reason that they were not aware of any standards, but doing what they were taught. The 4 (26.7%) respondents who indicated awareness of standards adopted by the University of Botswana Library gave examples of Special Collection Policy, Online Computer Library Center (OCLC), Dewey Decimal Classification (DDC) Scheme, Anglo-American

Cataloguing Rules, Second Edition (AACR2), Library of Congress Subject Headings (LCSH) and Resource Description and Access (RDA) as some of the standards. Specifically, one respondent stated that *"Resource Description and Access (RDA) standard is available for quality records"*. Another respondent affirmed that *"RDA is an international standard adopted by the University of Botswana Library for quality records"*. In further affirmation, yet another respondent said *"RDA is used whereby names of authors and contributors of information resources must be written in full while abbreviations are not allowed.*" One respondent expressed knowledge of standards by saying *"Special Collection Policy directs on what can be done and cannot.*

On the issue of compliance, respondents indicated their involvement with the standards requirements was through adoption of the DDC Scheme notation and application of regional (Africa) guide of classifying local information materials. Specifically, one respondent affirmed that "*when classifying, I comply with the regional (Africa) or locally agreed way or requirement of classifying by following the DDC Scheme.* In demonstrating his knowledge of the application of standard requirements, the respondent said *"class numbers do not end with digit '0' after the decimal point because this will be regarded as an incomplete class number in the DDC Scheme".* Another respondent stated *"I use DDC Scheme and the Library of Congress Subject Headings list for classification of information resources* adding *"we use copy cataloguing to export records of information resources from OCLC to the local system".* One respondent acknowledged the use of standards by saying *"I use Resource Description and Access (RDA) standard for cataloguing information resources".* The respondent asserted *"We apply RDA as required and never miss to apply it"* And in expressing her knowledge, compliance and application of the RDA rule, the respondent said *that the location of an information resource is written at Marc Tag 049, authors at Marc Tag 100, and contributors at Marc Tag 700*.

Responding on the modes of enforcing compliance, one respondent explained *"quality process is determined at Unit level through supervisors. Checks are done by supervisors, the supervisees do the work and the supervisors check. Generally everyone contributes because when an error is identified it is brought to the attention of the relevant person".* This practice was confirmed by three respondents, one of whom stated *"we work as a team, for instance, in areas where I am not*

good enough, I ask a colleague for help. Supervisors are there to give guidance and I comply with the guidance". Another said *"I adhere to what the supervisor says should be done and follow the prescribed guidelines of classification by using DDC Scheme".*

The second objective of the study sought to determine how the UBL measures quality records and comformity to the standards. The results mostly highlighted standards requirements as the instruments of quality and comformity. A respondent indicated that requirements from Online Computer Library Center (OCLC) standard were adhered to for the creation of quality catalogue records noting *"standards such as OCLC are available and followed to achieve quality catalogue records".* According to Uma and Geetha (2014) OCLC, a universal library database, is used by libraries to create quality catalogue records. Another respondent said *"a quality catalogue record will consist of useful information that will lead to retrieval and accessible records".* This statement was further explained by one respondent that *"a quality record will have correct locations".* Nevertheless, another declared "*quality is controlled by the supervisor who does quality control; on my own it is not easy to tell if I am doing the right thing or not".* Another respondent stated "*a record that has followed the set local requirements would be deemed as a quality record".* Moreover, the results showed 2 (13.3%) respondents indicated RDA as one of the standards complied with to catalogue quality records. Establishing classification on information derived from the title and contents pages of an information resource was also regarded as leading to quality classified information resource. One respondent attested *"the information from the title and contents page(s) of an information resource show whether a record is correctly classified or not because it is from the title and contents pages that a subject matter is derived for classification".*

When asked how quality catalogue records were ascertained, DDC Scheme was mentioned as a quality classification process that UBL uses in conjunction with the Library of Congress Subject Headings list. This view was expressed by one respondent who said *"I use DDC Scheme for instructions and guidance in classifying information resources".* Beside DDC Scheme, RDA was also mentioned. For instance, one respondent said *"I follow RDA rules for quality catalogue records".* Another respondent said "*I ensure the record is in compliance to the RDA*

international standard". The respondent however adds that *"I do database management to clean records".*

Standards awareness as a determining factor of information organization was also shown when addressing the aspect of mistakes and errors in organizing information. This study aspect clearly showed the extent to which standards awareness is important. The third research objective sought to establish the extent to which participants were aware of mistakes and errors made, the types of mistakes/errors and causes in information organization. To address, the respondents including management, cataloguers and classifiers were asked to indicate their awareness of any mistakes and errors often occurred while organising information. They highlighted the types of mistakes and errors and the causes. Only one (5.3%) of the entire respondents (19) interviewed indicated that s/he was not aware of any mistakes and errors in organising information resources, whilst 18 (94.7%) indicated awareness of some mistakes and errors while organising information. 'When asked whether users complain of OPAC being unfriendly, the respondent stated *"I am not aware of user complaints. No inconveniences have been noted and no complaints registered".* . When asked to highlight the type of mistakes and errors made while processing information resources, and to state the causes, 12 (63.2%) respondents indicated inaccurate classification numbers, the same subjects with different class numbers (14 respondents or 73.7%), and typographical errors (10 respondents or 52.3%). One respondent affirmed *"there are wrongly classified materials due to human error".* Another respondent cited incidences of same information resources allocated different class numbers, and hence placed in different shelves. This was corroborated by one respondent who said *"some call numbers in records do not match with those in the spines of information resources such that items end up in wrong locations".* Other problems stated by some respondents include incorrectly typed barcode numbers (9 or 47.4%), and lack of working tools (5 respondents or 26.3%). Specifically, one respondent confirmed the error when s/he noted that *"some class numbers and barcodes in OPAC do not correspond with the class numbers and barcodes on the information resources".* Another stated that *"some information resources have wrong barcode numbers attached to them,* adding that *there is need to provide enough scanners to capture barcode information correctly".* This was also substantiated by one respondent who explained *"some information resources have wrong barcodes because they are manually typed".*

Other problems highlighted include inaccurate status of records in OPAC, incomplete records, capturing information in wrong fields, bibliographic and items' class numbers not matching, old information resources not corrected to reflect newly adopted subject codes and class numbers, and class numbers bearing '0' after the decimal point. One respondent stated the abhorrence of the latter when s/he observed that *"some books have class numbers whose extensions after the decimal point end with digit '0'. Such class numbers are not correct because the '0' indicates incompleteness or a hanging class number in DDC Scheme".* Observation by the researcher confirmed the above mistakes and errors. In addition it was observed that there were database clean-up lists for information resources that were not correctly catalogued. The lists were meant for the cataloguing section to effect corrections. The initiatives and strategies made by UBL to correct mistakes and errors indicate that the library is quality focused.

When asked on the possible causes of mistakes and errors. The results revealed many contributing factors to mistakes and errors often noticed in the library records. One (6.7%) respondents indicated s/he was unaware of the causes of errors and mistakes. The results showed that 14 (93.3%) interviewees claimed awareness of causes of mistakes and errors in the library. The 14 respondents who responded to the question claimed the causes could be attributed to lack of proper training of classifiers and cataloguers, inadequate quality control checks and lack of working tools e.g. barcode scanners. The finding on lack of adequate training was coroborated by Adebayo (2009) who revealed that, many Nigerian university libraries were not complying with the quality assurance standard because the library staff were not properly trained, if trained at all. Nero and He (2018) affirmed that training cataloguers on current cataloguing requirements is a necessary approach to the prevention of mistakes and errors. The two authors further emphasised that, unless cataloguers are trained, they will not catalogue information resources correctly, and there can be other problems. Suárez (1992) had earlier affirmed that mistakes and errors are too costly, therefore training and appropriate working tools must be provided to workers for quality performance.

Inquiring more details on further training at the UBL a high number of 11 (68.8%) out of 16 respondents indicated that there were no training plans. One respondent regretfully stated that there was no training and cataloguers had to depend on OCLC for copy cataloguing. David-West and Angrey (2018) submit that some of the challenges faced by cataloguers and classifiers were indicated as inadequate cataloguing and classification skills. Machara and Jain (2016) confirmed this when they said that training programmes were not done regularly for the library staff.Specifically, one respondent stated *"there is lack of training for classification librarians".* This was substantiated by another who said "*most of the Subject Librarians come straight from school and are not further trained internally*". Another respondent confirmed and said *"there is lack of basic classification training".* The view of lack of training was further validated by one respondent who admitted *"there is no training for cataloguers".* Asked it there was any joint training organised for cataloguers, classifiers and the automation staff, the same 11 (68.8%) respondents said that there were no joint training plans. One respondent said *"there are no training plans, work is based on what the cataloguer is being shown by the workmates there are no training plans for classifiers as far as I know*". However 5 (31.3%) respondents stated that there were training plans. When asked to expantiate on the training plans available, one respondent asserted *"we were sponsored for study by the University of Botswana for Master's degree and part of the plan is to learn cataloguing and classification".* Another respondent indicated that *"cataloguers are trained once in a while".*

The fourth objective of the study sought to establish the role of the UBL Management to prevent non-conformity to the standards and quality of records requirements in organising information resources. When inquired, the respondents stated that the technical crew members are updated and on new developments of their specific areas of work. The respondents further mentioned that all staff members were encouraged to self-develop themselves and endeavour to participate in relevant continuing professional development activities that might be available. Furthermore, one respondent said *occasionally appropriate literature which deals with the staff's work areas is forwarded to them.* Another respondent indicated that *"cataloguers are given in-service training once in a while".* Considering these views expressed, it can be said that encouragements and once-in-a-while in-service training were the initiatives put in place to enable staff to conform to quality records requirements and discharge their duties.This, no doubt leaves room for improvement and space for further staff empowerment strategies.

DISCUSSION

From the findings obtained, though there was no concensus among the respondents, it can be said that there are standards requirements adopted for quality records adopted by the University of Botswana Library. Some of the standard requirements were documented while others were verbally conveyed by supervisors to their supervisees. The standards requirements adopted as noted by 11 respondents include Online Computer Library Center (OCLC), Resource Description and Access (RDA) and the Dewey Decimal Classification (DDC) Scheme. Bianchini and Guerrini (2016) had indicated in their study singled out Resource Description and Access (RDA) as an international standard designed for libraries and other information organizations to measure quality data cataloguing. Bianchini and Guerrini (2016) further stated that RDA is an information access enabler for information seekers. Nero and He (2018) assert that OCLC is a database of correct records. This was confirmed by one respondent who said that OCLC was available and complied with to achieve quality catalogue records. Adebayo (2009) submits that all libraries must have established quality standards and be in compliance with the set requirements. Lindstrom (1997) asserts that, Quality Assurance Manual when applied ensures that user needs are met and ensures defect free products and services.

Apparently, 4 respondnets did not believe there was any standard requirements followed by the UBL. This result suggests a gap that must be addressed among the technical staff in the Library. The finding tallies with the results of a study conducted by Haliru, Sokari and Bello (2016) in University Libraries of the Northwestern Nigeria; and Aboyade and Eluwole (2018) who also did their study in Nigeria. They indicated the same scenario that some library professionals were unaware of RDA standard requirements of cataloguing. They noted that staff members who were aware of the standard requirements complied with the standards to produce quality records, whilst those who were unaware of documented standards requirements, were assumed to have not been complying with the set standard requirements. In this respect, mistakes and errors in the process of organizing information are assumed to have been difficult to avoid. Suárez (1992) asserts that, compliance to the set quality requirements is core for quality work. Indeed this study found that there were mistakes and errors made while organising information. The observation results gave credence to the presence of mistakes and errors as there were many database clean-up lists of incorrectly catalogued periodicals, reference and other information resources. These findings are congruent to the results of Harinarayana (2018) who also found that some catalogue records of libraries in India had typographical errors. The findings are also in tandem with the findings by Nero and He (2018) who stated that misspellings and incorrect subfield information lead to inaccessible records while incorrect call numbers make it difficult for users to locate information resources as they will be shelved at wrong places. In this respect, UBL needs to monitor compliance to standard requirements and address factors that cause disorganized information.The study found that UBL has some interventions developed to correct mistakes and errors. With the application of database management as an intervention measure, quality assurance appears underscored. In his candid advice, Whitehall (1992) posits that requirements for quality in records need to be monitored for compliance. This suggests the need to increase awareness levels of the standard requirements for quality records among all UBL technical staff and the need for quality standard monitoring and enforcement to ensure compliance.

The study also revealed the root cause of incorrect classification numbers and incorrect barcode numbers being inadequate quality control checks, inadequate staff training, and working tools such as barcode scanners. Nevertheless, the data showed that UBL is concerned about the quality

aspect of records as it generates database clean-up lists for correction of mistakes and errors. The findings have shown that there is need for Quality Control team, cohesiveness, staff training and adequate modern scanners to meet quality standard.

The current study found that supervisors were considered important amongst determinants of quality in a record. This is congruent with Nero and He (2018) assertion that, quality control processing of electronic books needs compliance to RDA cataloguing rules. In his study of the National Library of Israel, Cohen (2017) reveals the adoption of RDA as a requirement and standard in the management of its records, the standard considered to be a cataloguing solution to spelling mistakes which could hinder records accessibility. In complying with OCLC and RDA for cataloguing, and Dewey Decimal Classification scheme for classification, UBL appears determined for quality assurance.

CONCLUSION AND RECOMMENDATIONS

The findings of this study have provided implications and indications on the importance of standards requirements, adoption, awareness and compliance. The study has also highlighted the importance of quality records and organized collection. The advantages of awareness and compliance to standard requirements, as well as the disadvantages of unawareness and non-compliance have been underscored. The advantages and disadvantages were stated to mobilise the library into a quality focused environment where information resources will be effortlessly accessible for information seekers. Broadly the study findings indicate that:

- There are factors contributing to disorganized information and collection, and standard requirements critical in information organisation.
- Mistakes and errors occur during information organization process.
- UBL has developed some interventions to address issues of mistakes and errors.
- UBL has standard requirements for quality records.
- Not all members of the technical crew are aware of the adopted standard requirements thus leaving a gap waiting to be bridged.
- The fundamentals of establishment, awareness, compliance with standard requirements are a sine-qua-non for an organised library collection.

Arising from the findings of this study, the following recommendations emanate.

- Since some cataloguers and classifiers claimed non-awareness of the adopted standards, it is important that the UBL Management through Resource Management should ensure maximum awareness of such requirements to the technical staff. This could be achieved through appropriate orientation organised for any new comer joining the technical team
- Furthera documentation of a manual on the requirements among others, should also be provided to new members
- The set standard requirements should also be closely monitored for compliance.
- With regard to inadequate education and skill on the use of standard requirements, in-house training should be provided to staff as a matter of priority for effective application of the requirements. This will also solve challenges that lead to poor quality records
- Experienced cataloguers and classifiers from outside and inside the university can be invited to occasionally be involved in training the UB technical staff.
- The UBL management should take advantage of lecturers teaching information organisation in the UB Library School and invite them to occasionally assist the technical crew.
- Library Management should consider sending the technical crew members for attachment of one or two weeks in some established academic libraries in South Africa.
- Technical staff should be encouraged to join the listserv of World cataloguers' forum established by the Library of Congress. The staff should be sponsored to attend full term training, conferences, seminars and workshops
- In view of the mistakes and errors that occur during information organization process, UBL needs to consider developing effective quality control teams to check the catalogued and classified information resources regularly before the processed materials are taken to the shelves, whilst adequate working tools such as barcode scanners should be provided to facilitate effective and quality processes of work.

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THE CHANGING LANDSCAPE OF ACADEMIC LIBRARIANSHIP IN THE COVID-19 ERA IN ZIMBABWE

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Abstract
The effects of the COVID-19 pandemic were felt in all sections of the society, libraries included. A study was done to examine the changing landscape of academic librarianship in Zimbabwe as a result of the COVID-19 pandemic. The aim of the study paper was to assess the changes that were brought about to three university libraries due to the pandemic and examine the challenges that were faced by academic librarians in meeting the information needs of patrons. Data was collected through an online questionnaire that was distributed to University Library Directors, Deputy Directors, Technology Librarians, Reader Services Librarians and Technical Service Librarians to gauge the effects of COVID-19 on service delivery. A multiple case study approach was used and three public university libraries were sampled using random sampling. The findings of the study showed that all the library services were greatly affected by the closure of physical libraries as a way of avoiding the spreading of the virus. Students were forced to vacate halls of residence and were not allowed on campus although they were supposed to continue learning so as to finish the semester. Academic librarians were forced to redesign their services and were offering off campus e-resources as well as virtual reference services to keep assisting the patrons when teaching and learning shifted online. The major challenge experienced in the delivery of library services to remote users included issues of internet access, electricity connectivity, bandwidth in far flung areas and shortage of equipment to deliver the services. The authors recommend the urgent need to reskill and upskill the academic librarians to be able to fully operate in a virtual environment as well as to remain relevant in the "new normal". Institutions should be intentional in offering support to academic libraries so that they get the necessary infrastructure to offer library services and products in the digital and COVID-19 era.

Keywords: *Academic Librarianship, COVID-19 Pandemic, Libraries and new normal, Library* closure, Redesign of library services, Virtual reference services, Online teaching and learning

INTRODUCTION

A library is the heartbeat of an institution and having it at an institution helps learners to get resources and services to complete their studies. The COVID-19 pandemic brought changes to the way institutions operate, libraries included. Institutions were closed, students were forced to go home and staff members were forced to stay at home and work from home. The way of living and operations in libraries and institutions changed and staff and students had to adjust since

most activities came to a standstill during the lockdown period. Students were forced to learn from their homes and this made the librarians and information professionals to change the way that they operate. Librarians were quick to adapt to new changes and made sure that they continued to offer library services to their users. Since students were not staying on campus, ways of providing services were to be devised by the librarians. These changes made the librarians learn and upgrade themselves on what to do. Users had to rely on e-resources which were accessible as compared to hard copies that were locked inside the libraries.

Universities in Zimbabwe have libraries at their institutions and some have branch libraries that are allocated in town to cater for those who do not stay in town. These institutions are located in different regions to make sure that all the regions are included and students from different backgrounds are included in the study. The three institutions under study were selected from different provinces which are Harare, Manicaland, and Matabeleland. One of the institutions is a private university while two are public. The library IT activities are supported by the infrastructures in the libraries and also in the IT section of the university and some of the institutions were delivering online services before the outbreak of the COVID-19 pandemic. It is against this background that this study was done to

PROBLEM STATEMENT

COVID-19 brought so many challenges in the academic life of both learners and lecturers and library users had to go through a hard time. Activities at universities had to stop and institutions had to close because of the COVID-19 pandemic. Learning continued to take place and libraries had to come up with ways and strategies on how to provide the services to the users. Connell, Wallies and Comeaux (2021) noted that the COVID-19 pandemic has greatly impacted higher education, including academic libraries. The COVID-19 pandemic led to unprecedented upheaval in the provision of library services at universities and colleges across the country as the institutions moved to online courses (Tolppanen 2021). This study sought to find out the changes that were brought about because of COVID-19 in Zimbabwe and how three public university libraries in Zimbabwe provided services to the students and faculty members

OBJECTIVES OF THE STUDY

The following objectives guided the study:

1. To examine the changes that were brought by COVID-19 in academic libraries?
2. To analyse the challenges faced by academic libraries as a result of COVID-19?
3. To document the opportunities brought about by COVID-19 in academic libraries.

ACADEMIC LIBRARY SERVICES PRE-COVID-19

The world considered that the library was a social institution within an academic setup that provided numerous personal and specialized services to its user community (Panda, Bhatt, Vijaykumar and Singh 2021). Because of this, academic institutions in Zimbabwe invested a lot in opening library services to its clientele late into the night and this helped the users to maximize the conducive reading environment after having classes during the day and also those who studied on part time-basis. Users used to enjoy interacting and socializing with library staff members and this gave them time to get closer to them whenever they needed help. Before COVID-19 libraries were providing many services to their clientele face to face and there were a number of branch libraries off campus where users would go and research and get reading resources to use in the comfort of their homes. The clientele enjoyed all the services in the library and they had assistance from the library staff members at any time of the day. A study by Ameh, Ukwuoma and Oye (2021) revealed that since the outbreak of the COVID-19 pandemic, there have been library closures around the world. Globally, teachers, students and librarians have been forced to transition to an online-only environment, as numerous schools, universities and libraries have been compelled to close their campuses in response to COVID-19 mandates (Esherenana and Oyevwe-Tinuoye 2021). There was no challenge with data bundles before the COVID-19 pandemic for the library users since they were using hard copies on campus and Wi-Fi connection.

ACADEMIC LIBRARY SERVICE DURING THE COVID-19 PANDEMIC

During the COVID-19 pandemic period, library services changed and library staff members had to find ways to continue offering services to their users despite the closure of physical libraries.

Learning continued to take place online using different digital platforms and examinations were done online in some institutions. Libraries provided online digital resources and virtual services to the users for research purposes. Staff members had to attend training, workshops and conferences online and this made these meetings to be attended by many people since some of them were being done online and the expenses for conference fee was affordable. This helped staff members to get new technological skills which helped them as they grew in the profession and offered reference services to their users online. This made life easy for the users because now they could get in touch with the library staff members. According to Newman (2021), the good news is that many leaders developed more confidence in making major changes and have proven to themselves that they can act quickly because COVID-19 forced them to. In addition, UNESCO, in cooperation with the European Commission, Twitter, and the World Jewish Congress, launched a series of visual learning resources in the form of infographics to raise awareness of phenomena on the rise during COVID-19, including the existence and consequences of conspiracy theories (UNESCO, 2020).

Clear processes were also needed for the sanitation and disinfection of books and other resources, keeping on the monitoring of research on how materials should be handled to mitigate risk of exposure to the virus (Institute of Museum and Library Services 2020). Libraries in Zimbabwe were fumigated once a day, sanitisers were put by the doors, masking up and washing of hands were done before entering the library. Libraries had to quarantine books in the drop boxes after they were returned by the users for a number of days. The number of users entering the library were minimized to make sure that social distancing was maintained. Recording of names were done for all who entered the library and their contact details for follow-ups in case of a COVID-19 case. Opening hours were reduced because of curfew times so as to allow students and staff to get to their homes within the stipulated times.

ACADEMIC LIBRARY SERVICES POST COVID-19 PANDEMIC

COVID-19 impacted greatly on information centres and academic libraries in Zimbabwe. This made academic libraries come up with ways on how to continue offering services to their users. Librarians had to train users on how to access online resources, collaborate with other libraries

and share ideas. Chakraborty and Jana (2021) noted that librarians equipped their users with the required information literacy skills adequately. According to Gwyer (2015), collaboration among libraries increased access to digital resources and the sharing of resources as inter-library loan systems and enhanced research output. The pandemic helped to identify work roles that can be downsized or replaced with technology as a technique to mitigate infection risk while retaining productivity (Kumar and Modalavalasa 2020). Post COVID-19, professionals, across the globe, opened the virtual doors to their houses and families, while 'home-working' was established as the new standard (Martzoukou 2021). The main difference between the higher education field in Zimbabwe and those in European countries is the lack of sufficient infrastructure to utilise online teaching and learning as well as lack of basic equipment from the students' side and connectivity challenges (Taru, 2020).

CHANGES BROUGHT ABOUT BY THE COVID-19 PANDEMIC

The first objective of the study sought to find out the changes that were brought by the COVID-19 pandemic in academic institutions in Zimbabwe. The pandemic forced individuals and businesses around the world to shift to working remotely using multiple services, such as Zoom, Skype, Slack, Microsoft Office Suite, and G-Suite applications and this transition is forcing companies to re-evaluate their long-term staffing needs (Kumar and Modalavalasa 2020). Libraries come up with innovative ways of reaching out to their users through different ways. Similar sentiments were shared by Mohan, Rao and Shivananda (2021) who noted that the COVID-19 pandemic necessitated librarians to come up with reformed, effective, and innovative services by implementing technologies to keep the information flow from the libraries to both the categories of users, i.e., users who use the library remotely as well as users who visit the library physically. Ashworth (2020) further noted that the outbreak of the COVID-19 pandemic has brought a lot of creativity and innovative practices in library programming, operations and services. Libraries have been repurposed to perform traditional conventional and other social functions and thus, realigning library services.

OPPORTUNITIES BROUGHT ABOUT BY COVID-19

The COVID-19 pandemic has necessitated a rapid leveraging of digital skills, platforms, expertise, and models of service delivery to continue providing exceptional and transformative experiences for the University of Calgary community (Murphy, Lewis and McKillop 2021). Furthermore, during the pandemic, academic libraries were involved in actively offering additional services around the curation of resources related to the COVID-19 pandemic outbreak to help academic researchers advance their understanding as well as help them increase awareness of the importance of information evaluation for the public as a protective mechanism against the COVID-19 'infodemic' (World Health Organization, 2020). The COVID-19 crisis provided an opportunity for the universities to reconsider if their leadership in all aspects had the requisite skill sets to manage their departments during the crisis (Stoller 2020). Library consultations significantly shifted, and many libraries halted face-to-face interactions due to COVID-19 (Anderson et al., 2021). However, these changes brought some challenges in the libraries. Academic libraries in Zimbabwe managed to offer digital and virtual library services; however, they faced challenges, including a lack of internet connectivity to interact with patrons (Tsekea and Chigwada, 2020).

CHALLENGES FACED AS A RESULT OF THE COVID-19 PANDEMIC

The second objective sought to assess the challenges brought about by COVID-19 to selected academic libraries in Zimbabwe. When COVID-19 struck in different continents, libraries faced some challenges in providing information to their users. Some other challenges include poor funding, indifferent attitudes of library managers, absence of well-defined and uniform library policies and non-compliance with the demands of ICT (Nkechi et al., 2018). It was concluded that COVID-19 by its nature is disruptive to everyday life, restrictive to human-social relations and is an instigator to tradition, spirituality and intellectuality in the country (Chirisa et. al, 2021). The pandemic has affected the users in finding the information they need from the libraries due to the worldwide lockdown (Asif and Singh 2020). The pandemic impacted heavily on academic research productivity of faculty members (Krukowski et. al, 2021). There were delays in publications and printing of books as people were working from home and this made libraries unable to get reading resources from the publishers. Some of the teaching staff, students and library staff lost professional development opportunities to support research because of

limitations to travelling in universities. Limited access to campuses made the users fail to access the hard books that were available in the libraries since most of them could not afford to pay for data bundles. Reading environment was poor and unwelcome to the students and they found it difficult to concentrate on their studies. The structure of education is altering, and especially during the COVID-19 pandemic situation, users required more online services, and their expectations were beyond the limitations with limited and inadequate library budget (Neufeld, 2014). Ohler and Pitts (2021) recognize the many changes COVID-19 has brought to the entire academic enterprise that has long been challenged by rising personnel and healthcare costs, a highly competitive market for new students and research funding, and pressures to upgrade physical infrastructure.

METHODOLOGY

The study used an interpretivist paradigm using a qualitative research approach. A survey was employed using a multiple case study design where data was collected using an online questionnaire which was distributed to university library directors, deputy library directors, technology librarians, reader services librarians and technical services librarians in order to gauge the effects of the COVID-19 pandemic on library service delivery. Three public university libraries in Zimbabwe were sampled using random sampling and 15 librarians were selected using purposive sampling and the questionnaire was distributed online. The research sites and the respondents were anonymised for confidential purposes. Thirteen responses were obtained out of the sample of 15 librarians. The survey monkey analysis feature was used to analyse the data which was presented thematically.

RESULTS AND DISCUSSION

The first objective of the study sought to document the changes that were brought by the COVID-19 pandemic in academic libraries. The results showed that all the library services including circulation, acquisition, reference, technical, information literacy training and library orientation were affected by the COVID-19 pandemic. Another respondent chose “other” and

added that they used to hold research clinics for researchers and these were also affected as shown in table 1. This is in line with what was stated by Ukwuoma and Oye (2021) revealed that since the outbreak of the COVID-19 pandemic, there have been library closures around the world. Chirisa et. al, (2021) noted that COVID-19 by its nature is disruptive to everyday life, restrictive to human-social relations and is an instigator to tradition, spirituality and intellectuality in the country.

Table 1: Library services affected by COVID-19

ACTIVITY	**NUMBER OF RESPONDENTS**
Other (Research Clinics)	1
Acquisitions	5
Technical services	6
Reference	11
Information literacy training	11
Library Orientation	11
Circulation	13

It was noted that all face to face activities were suspended during the COVID-19 pandemic era since people were supposed to minimise contacts in service delivery. The services that were suspended are shown in figure 1. Those who chose "other" indicated that the baggage area was closed and patrons who visited the library were supposed to come without bags. This was supported by Esherenana and Oyevwe-Tinuoye (2021) who pointed out that globally, teachers,

students and librarians have been forced to transition to an online-only environment, as numerous schools, universities and libraries have been compelled to close their campuses in response to COVID-19 mandates.

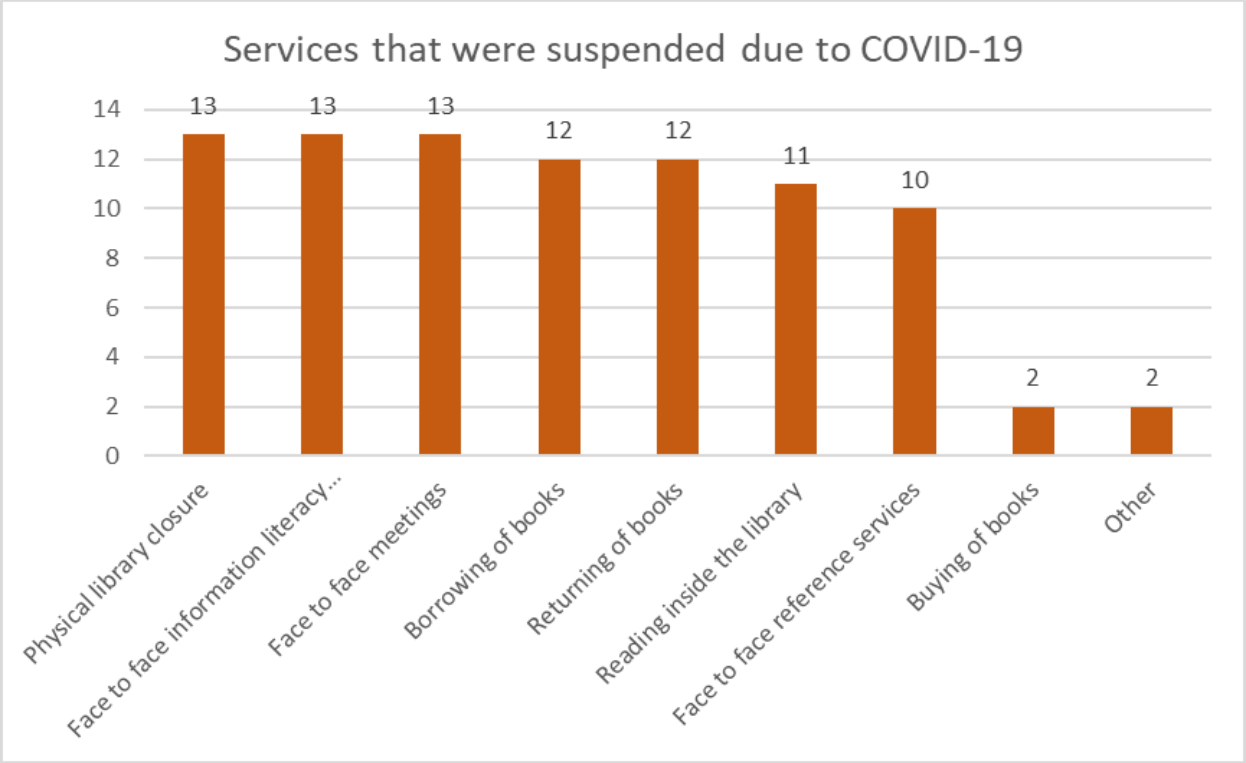


Figure 1: Services suspended due to COVID-19 pandemic

Academic libraries in Zimbabwe introduced new services during the COVID-19 pandemic era to replace the banned services in a bid to curb the spread of the virus. The results showed that most of the new services were virtual since there was a need to minimise direct contact with other staff members and patrons. The services introduced are shown in figure 2 and this is supported by Ashworth (2020) who stated that the outbreak of the COVID-19 pandemic has brought a lot of creativity and innovative practices in library programming, operations and services. In Zimbabwe academic libraries that were studied, there were no self-service in borrowing and returning books and the librarians did not scan hard copies to send to the patrons during the COVID-19 pandemic era.

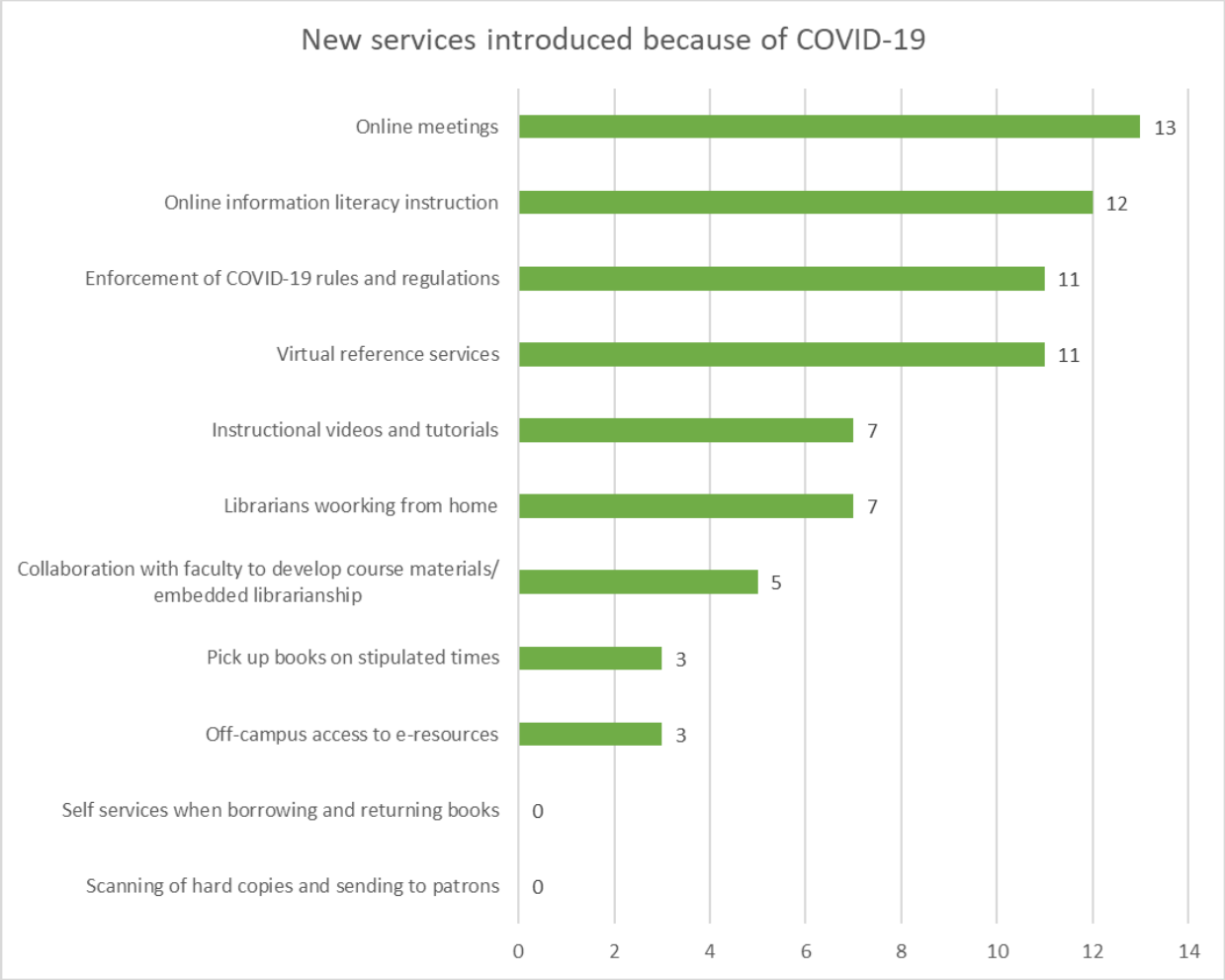


Figure 2: Services that were introduced because of COVID-19 pandemic

The second objective dealt with the challenges faced by academic libraries in the COVOD-19 pandemic era. The respondents indicated that they faced a number of challenges as they try to operate in the new era in service provision. These include data issues, poor attendance by library patrons to training sessions, power outages, lack of digital literacy skills, poor internet connection among others as shown in figure 3. This was supported by Krukowski et. al, (2021) who indicated that the pandemic impacted heavily on academic research productivity of faculty members.

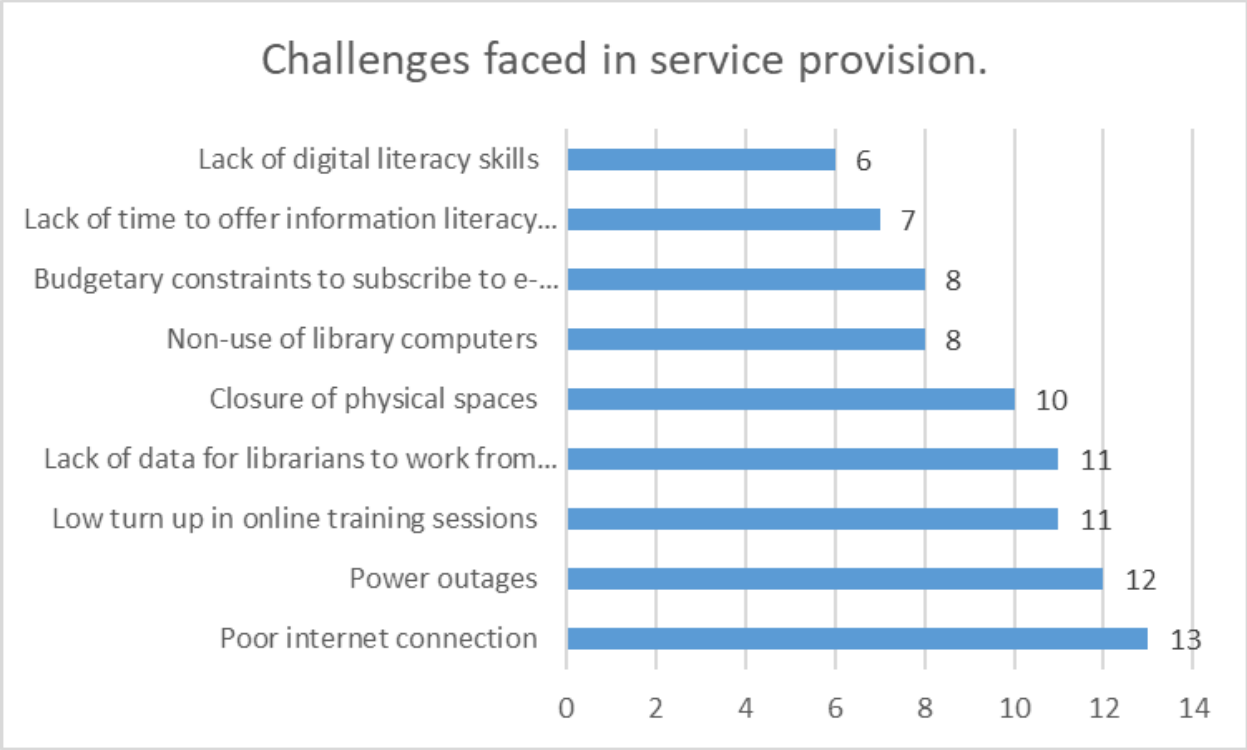


Figure 3: Challenges faced in service provision in the new normal

The third objective documented the opportunities that were brought about bu COVID-19. The respondents indicated that the coming of the COVID-19 pandemic offered some opportunities as well which include an increase in the usage of e-resources when teaching and learning shifted online, utilisation of open educational resources, development of virtual libraries among others as shown in figure 4. This was supported by Shivananda (2021) who indicated that COVID-19 pandemic necessitated librarians to come up with reformed, effective, and innovative services by implementing technologies to keep the information flow from the libraries to both the categories of users, i.e., users who use the library remotely as well as users who visit the library physically.Academic libraries in Zimbabwe managed to offer digital and virtual library services; however, they faced challenges, including a lack of internet connectivity to interact with patrons (Tsekea and Chigwada, 2020).

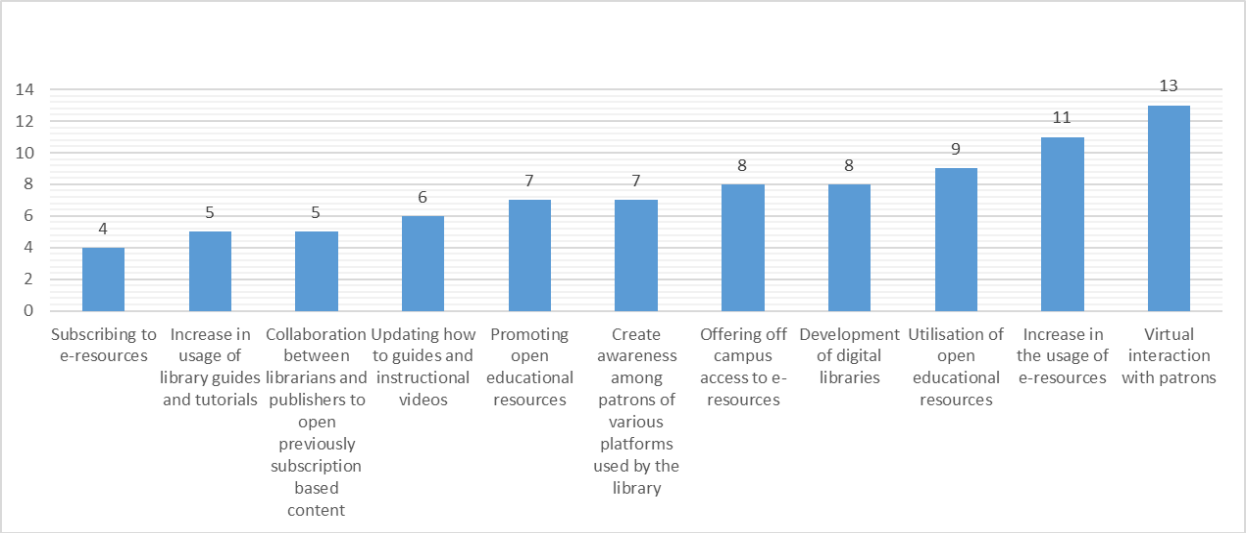


Figure 4: Opportunities offered by COVID-19

CONCLUSION AND RECOMMENDATION

The study revealed that university libraries in the selected universities in Zimbabwe were closed due to the COVID-19 pandemic and this made students fail to access the physical resources in the libraries as they continued with their studies. Librarians had to come up with innovative ways to provide services to their users who were studying and teaching online. This made the library staff members improve their technological skills, conducted meetings online with the users and provided virtual reference services among others. However, some students found it difficult to access library resources online because they could not afford to buy data bundles which are regarded as expensive in Zimbabwe. The authors recommend that library staff must upskill, reskill, and retool to be able to offer virtual services to users. Academic libraries must invest enough budget allocations towards electronic information resources and provide avenues to access such resources so that users can be able to access them when they are not on campus using cheap platforms that can be affordable.

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PART THREE

RECORDS MANAGEMENT

THE STATUS OF THE MANAGEMENT OF SOCIAL MEDIA RECORDS AT THE GOVERNMENT PRESS OFFICE (GPO) IN ESWATINI

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Abstract

Social media platforms have increasingly been used in the 4th Industrial revolution by organisations and individuals alike to share information, educate, promote services and communicate. The use of social media platforms globally has introduced a new dispensation in the communication between governments and their citizens consequently generating records. In the 4th Industrial revolution, social media platforms prove to have surpassed other forms of communication though some governments and organisations still do not have proper measures in place to manage social media records which are evidence of business activities. Thus the purpose of this study is to assess the status of social media records that are generated by the Government Press Office (GPO) in Eswatini. The study employs a systematic review of literature on the management of social media records. The literature review include a review of Eswatini government policies, relevant legislation, records management guidelines, research articles on social media and other relevant documents. This paper established that social media records on Eswatini Government social media platforms are not being captured for preservation and access. Most posts with images are also posted without proper captions that provide an adequate description of the context of photographic records. The regulatory framework is found weak with regards to the management of social media records. The GPO is yet to institute mechanisms for the necessary declaration, appraisal and preservation of social media records for perpetuity, compliance, e-discovery and other legal and records management requirements. It is recommended that the GPO capture and manage social media record using the Open Archival Information System reference model; provide training on management of social media records and design relevant policies such as a social media records policy.

Keywords: *Electronic Records Management, Eswatini, Government Press Office, Records, Social media records*

INTRODUCTION AND BACKGROUND

Social media are 'online technologies and practices that people use to share opinions, insights, experiences and perspectives with each other, transforming traditional one-to-many interactions into many-to-many interactions' (International Organisation for Standardisation (ISO) - 22329, 2021: pp. 1). Social media are virtual environments of the internet (for example blogs, vlogs, wikis, podcasts, and sites) with tools for creation, storage, promotion, dissemination and discovery of various forms of user-generated content (Franks, 2010; Mosweu, 2019). The use of

social media platforms globally has introduced a new dispensation in the communication between governments and their citizens. Previously, governments were conservative relying mainly on print press, radio and television to communicate with the public and other stakeholders. With the exception of some radio programmes, this was disadvantageous in that the communication was mostly unidirectional and outbound from the government to the people. Citizens were predominantly deprived a platform to voice out their opinions on the salient governance issues that were being raised by their governments and impacted on their lives. However, governments have since acknowledged the opportunity to strengthen their openness and accountability through reaching out to the ever-growing community of people that use social media in the world (Bertot, Jaeger & Hansen, 2012).

In this age of widespread use of social media, the dominance of unilateral communication from government to citizens has changed dramatically as more governments use social media platforms as one of their official modes of communication and thus have increased their social media presence owing to the promulgation of regulatory frameworks in the likes of Electronic Evidence Acts, Cyber-security Acts, Freedom of Information, and Data Protection Acts, to name a few. On social media, governments can engage and exchange views with citizens through the use of various functionalities such as comments and polls.

The increased use of social media by governments has also culminated in an increased volume of social media records (Mosweu, 2021). It has also made records management and information technology to be intertwined together. In addition, records managers and officials in government departments are confronted with the statutory need to enforce compliance with Archival laws connected to the preservation and long term storage of official government records (Franks, 2010). Section 2 of the National Archives Act of 1971 in Eswatini defines a record to include "any newspaper, book, document… or any record or other material, contrivance or device by which information is conveyed and words or images reproduced wither in sound or light." This positions social media records well within the protection of the law as national memory. This implies that they have to be managed as official government correspondence similar to other record types. Thus the expectation is that all public institutions should strive to uphold this

statutory requirement by putting in place mechanisms to capture and preserve official social media records for posterity.

Eswatini is a small country in southeast region of Southern Africa occupying only 17 000 km2 of the African landmass. It shares borders with Mozambique and South Africa. The country is administratively divided into four districts or regions, namely: Hhohho, Manzini, Lubombo and Shiselweni; and further divided into 55 traditional local authorities or administrative areas (Tinkhundla) which are responsible for 385 chiefdoms (Magagula, 2017). As of January 2021, the population of the country was 1.17 million people, with women comprising 50.8%. Internet penetration (percentage of the total population of Eswatini that uses the internet) was reported to be at 47% (Kemp, 2021). When it comes to social media activity, Kemp (2021) disclosed that there were 350 000 social media users in Eswatini in January 2021 which was a 35% increase from 2020. The number of social media users is 30%, which is almost a third of the entire population.

Although research has been done in Eswatini with regards to social media such in journalism (Rooney, 2013; Lunga & Mthembu, 2019) and elections (Ndlela & Mano, 2020), research that addresses the management of social media records is lacking. The mandate of records management issues in the Eswatini Governments is vested on the Eswatini National Archives (ENA). The ENA is responsible for advising Government Ministries and Departments on the management of all their current and semi-current records. In addition, the ENA acts as the ultimate custodian for both semi-current and non-current records regardless of format (Tsabedze, 2020). This implies that the ENA is expected to actively partake in records management activities that will ensure the awareness of records management responsibilities, training of staff, resource mobilisation and top level management support relating to social media records.

STATEMENT OF THE PROBLEM

Different types of social media platforms are used by governments across the world to communicate official information to their citizens. This inherently renders the records that are generated in the process to be official records. Hence there is need for such kinds of records have

to be maintained as all other types of official records. However, the problem is that in practice this does not usually happen (Doran, 2015).

Research has shown that social media records are scattered everywhere online and are not managed properly, except in some developed countries like the United Kingdom which has been archiving government activity online for more than ten years (Espley, Carpenter, Pop & Medjkoune, 2014). In developed countries, such as the United States of America, Canada and Australia, governments departments were reported to be vulnerable to risks of using social media such as vulnerability to cyber-attacks, lack of compliance, inefficient use of resources and inability to respond to Freedom of Information (FOI) requests and e-Discovery (Franks 2010). As a result, the said governments formulated social medial management policies, retention and disposal schedules, strategies, and guidelines which serve as indispensable tools in assisting institutions to determine the fate of valuable social media records (Franks, 2010; National Archives and Records Administration, 2020).

In the East and Southern Africa Regional Branch of the International Council on Archives (ESARBICA) region literature that points out the issues in the management of social media records is limited (Mosweu, 2018; Mpala & Dewah, 2019; Mosweu, 2019; Netshakhuma, 2019; Pondiwa and Phiri, 2019; Mosweu, 2021). Mpala and Dewah (2019) lamented that although the National University of Science and Technology (NUST) in Zimbabwe recognised social media records as official records, the records management policy framework was silent on social media records and that creation of records did not ensure the generation of authentic records.

While there has been an escalation of the use of social media by the Eswatini Government during the Covid-19 era, which has necessitated instant and timely public announcements to be made some of which require immediate attention such as notice of closure of border posts and other government outlets for fumigation, notice of vaccination areas and daily Covid-19 statistics, the government has not yet published any strategies for the classification, appraisal and controls of social media records. Notwithstanding the National Archives Act of 1971 mandate the National archives to properly manage government records in various formats (Tsabedze, 2020). Social media research in Eswatini has been on other sectors such as journalism and elections (Rooney, 2013; Lunga & Mthembu, 2019; Ndlela & Mano, 2020), which revealed a gap in research on the

management of social media records. Thus it is imperative to assess the status of social media records that are generated by the Government Press Office (GPO) in Eswatini.

RESEARCH QUESTIONS

The broad research question is: What is the current status of the management of social media records in the GPO in Eswatini? The specific research questions of the study are as follows:

1. What are the existing regulatory framework and current uses of social media in the GPO in Eswatini?

2. What is the status of processes for creation, capture, storage, use and disposal of social media records in the GPO? and

3. What are the challenges faced by the GPO in the management of social media records?

LITERATURE REVIEW

The discussion that ensues is arranged into the following themes: Social media usage around the world; regulatory framework; management of social media records; and challenges faced by the GPO in the management of social media records.

3.1 Social Media Usage around the World

Before the advent of Information Communication Technologies (ICTs) and the internet, and for many years, people fought for their rights in the physical world. With the introduction of ICTs and strong permeation of the internet and its increased usage, a lot of information is created and people have to now defend their rights in the virtual world as well. Research shows that over ninety percent of adults use social media and it is the leading activity on the internet (Murphy & Fontecilla, 2013). Social media networking websites present themselves in various forms and styles, with each tailored and servicing a particular demographic and providing a diverse types of content (see Table 1). In addition to videos, photographs and textual posts, social media users can also share their location. Thus the varied and dynamic nature of sharing information on social media platform has presented opportunities for sourcing legal evidence. As such, a number of cases have been resolved and perpetrators of crimes are arrested (Murphy & Fontecilla, 2013).

Table 1 below shows some of the social media platforms that are widely used in the world. It is not a comprehensive list, but gives information such as launch dates and the URLs for the most popular social media sites.

Table 4: *Popular social media platforms in the world (Source: Thomson, 2016).*

Platform	**Date Launched**	**Web URL**	**Function**
Facebook	2005	facebook.com	social networking
Flickr (Yahoo)	2004 (bought by Yahoo 2005)	flickr.com	user-generated content
Foursquare	2009	foursquare.com	user-generated content, social networking
Google+	2011	plus.google.com	social networking
Instagram (Facebook)	2010(bought by Facebook 2012)	instagram.com	user-generated content, social networking
LinkedIn	2003	linkedin.com	social networking (professional)
Pinterest	2010	pinterest.com	user-generated content, social networking
Reddit	2005	reddit.com	bulletin board system, social networking
Twitter	2006	twitter.com	social networking
YouTube (Google)	2005 (bought by Google 2006)	youtube.com	user-generated content

Social media records are electronic records and the Records Continuum Model is relevant for managing them. One of the key elements of this model is evidentiality which emphasises the

importance of the interrelationship between records in enriching the records context as collective memory (Upward, 2000). Collective memory can either be historical or autobiographical memory. Historical memory refers to remembrance of events experienced only through textual records and other types of records to fill gaps in people's memory since they cannot remember everything. On the other hand, autobiographical memory refers to recollections of past events by an individual who has personally experienced them. This type of memory degenerates with time and therefore historical memory plays a vital role in this regard since it is fixed, reliable, trustworthy and authentic (Gang, Kim, & Hyo-Jung, 2019). Jimerson (2003) defines historical memory as contained in archival records and is preserved because of the value therein as affixed in a record medium and static so that it can be utilised for agreeing with or challenging autobiographical memories.

In many countries such as the republic of south Africa and the Republic of Korea, the National Archives Acts state that the records generated by government employees (public records) (Gang *et al*., 2019; Mosweu, 2019) and the records that recite their Nation's experiences (social records) should be managed as records for posterity as part of cultural heritage. It is therefore crucial for governments to understand the contribution of social media records as historical records because they also document a Nation's experience (Gang *et al*., 2019). In addition, due to the rapid disappearance of web content there is a pressing need to select social media posts for long-term preservation. Studies have shown that even with content that was archived only a year before, the proportion that is still online and unaltered is less than 10% (Thomson, 2016).

According to Gang *et al*. (2019), governments utilising social media need to create collections focusing on social media. This can be achieved by formulating an acquisition or collections policy for social media records. The policy would have a purpose statement and legislative mandate statement for establishing the archives, and the mission of the organisation. It would also delineate the scope of the collection and what classification mechanisms will be used. In addition, the formats to be archived are also be stated. Although it is recommended for governments to keep records in all the different formats they were originally posted online, it is solely dependent on the preservation resources available to the respective government. Furthermore, the policy should delineate the appraisal mechanism for establishing the social media archive. Selection criteria are important not only for creating a meaningful and coherent

collection of social media but also when considering long-term storage. Collections of social media come in many sizes and shapes, from spreadsheets containing tweets and their identification numbers to photographs. The policy would provide a brief synopsis of what the archive entails. Any links to the social media pages where the original records are posted must also be provided (Thomson, 2016).

When managing records, the information describing the context should be captured as metadata as records lacking such information cannot be authoritative records (ISO 15489, 206). Metadata sets out the context, the relationships and dependencies of a record with other records and the originating records systems. It also provides connections to social and legal contexts, and the records creators who created, managed, and used the records. It is invaluable for understanding any collection of records. Such metadata is defined by in a metadata schema that will guide capture of metadata on declaration of records (Gang *et al*., 2019).

3.2 Legislation and Regulatory Issues

An organisation that has a robust policy, legal and regulatory framework can adopt electronic initiatives and competitively participate in the worldwide information age (Busari, 2019). The ISO - 15489-1 (2016: pp. 7) states that "records systems should be managed in compliance with requirements arising from business, community or societal expectations and the legal and regulatory environment." However, one of the challenges experienced by ESARBICA countries includes the absence of policies, legislation, and procedures that provide and enabling environment to guide the management of both physical and electronic records (Khumalo & Baloyi, 2017). When it comes to social media content, there are many regulatory issues. For example, it does not suffice that the content may have been created by government and therefore has sole rights to it and can thus regulate how it is utilised. The terms and conditions of platforms may restrict where and how data may be stored, barring, for instance, storing data with a third party such as a cloud storage provider. Therefore not only the size but the legal framework of social media records influence how they can be preserved (Thomson, 2016).

3.3 Management of Social Media Records (creation, capture, storage, use and disposal)

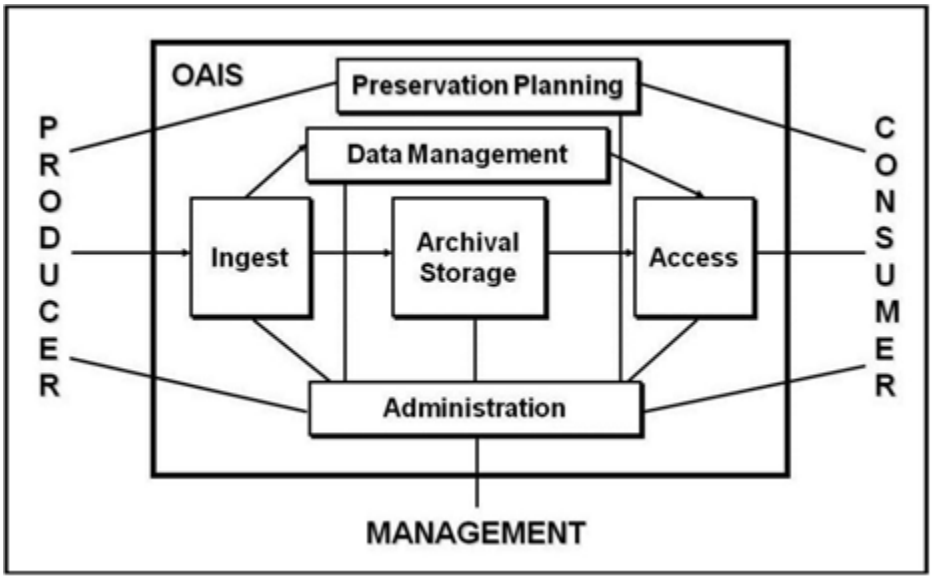
Governments can use a number of strategy options to assist them in the management and preservation of their social media records. Application Programming Interfaces (APIs) can be

used to collect all social media posts for back up. Data re-sellers are companies that offer services based on data harvested through APIs, for example Gnip, which governments can use to buy processed records (Thomson, 2016). Collecting institutions in government could cooperate with a third-party archiving service as the degree of specialised knowledge of software development, and purchasing data from resellers may be expensive. Self-archiving platforms are back-up services offered by some social media platforms by allowing users to download the content from their account in machine-readable formats. For example, Facebook, Google, and Twitter offer this service (Thomson, 2016).

3.3.1 The Open Archival Information System (OAIS) Reference Model

The OAIS reference model was developed by the Consultative Committee for Space Data Systems (CCSDS) in 2002 as technical guidance for the long-term archiving and sharing the archiving information. The reference model is the ISO 14721 standard (Adu, 2015; Ngoepe, 2017). Numerous content archiving organisations follow this guidance model for establishing archiving infrastructure (Hwang, Shon & Park, 2020). The word 'open' in the name does not suggest that the records kept using this model are open for everyone to access but it refers to the fact that it was developed in an open discussion where the general public had input (Adu, 2015; Ronoh, Kingori & Nzioka, 2018; Hwang *et al.*, 2020). An archival information system refers to "an organisation, which may be part of a larger organisation, of people and systems that has accepted the responsibility to preserve information and make it available to a stated community" (Lavoie, 2014: pp.7). It comprehensively takes into account the sustainable preservation needs of digital information assets through processes of ingestion, archival storage, data management, access, dissemination and migration to latest media formats (Ngoepe, 2017). The two main functions of this reference model in the context of social media records are to ensure that records are preserved for posterity and that access is provided to the archived information. The OAIS reference model consists of three separate but related parts namely external environment, functional components and information objects which are ingested, managed, and disseminated by the OAIS as shown in Figure 1 below (Lavoie, 2014).

Figure 1: OAIS Functional Model (Lavoie, 2014:12).



The operational environment of the OAIS model comprises of the producer, consumer and management. A producer is an individual, an organisation, or system that transmits information into the OAIS for long-term preservation (Lavoie, 2014). A producer delivers the information for preservation as the submission information package (SIP). However, management has the role of controlling the OAIS; managing the records as an archival information package (AIP) whereas the role of the consumer is to interact with OAIS services to search and retrieve the preserved information (Hwang *et al.*, 2020). The first responsibility of governments for their social media archive, in an OAIS archive, is to establish clear selection criteria for deciding which materials are suitable for addition into the archival store using factors as subject, origin, or format and the main purpose of the archive (Lavoie, 2014).

3.4 CHALLENGES IN THE MANAGEMENT OF SOCIAL MEDIA RECORDS

In the past decade, the academic and archive sectors have increasingly acknowledged the value of social media records for research. However, there are challenges in managing these records. The 4th Industrial Revolution is dominated by Web 2.0 social media applications. Web 2.0 social media platforms comprise machine-readable data generated by users in real-time, complicating the issues of capture and indexing even further than similar issues facing current web archiving. Prior to the advent of Web 2.0 applications, Web 1.0 technology was used which presented in

static webpages where information posted online could be gathered by automated software called web crawlers (for example Heritix). Web 2.0 applications allow participation of users through for example likes, reactions and comments and therefore the information is ever-changing and dynamic. Therefore organisations now have to develop specialised application programming interfaces (APIs) for collecting information (Thomson, 2016).

It difficult to collect required information on some social sites such as Facebook which offer more restricted access through APIs as some user profiles are on private mode and users restrict the visibility of their content. APIs collect all classes of information including personal metadata such as locations, occupations and date of birth of users which makes difficult to provide open access due to risks to privacy and data protection that are introduced (Thomson, 2016). In addition, it is not readily possible to index the data in order to render it useful to present and future researchers. Because archiving social media records is new, there are no specific standards and best practice to benchmark the long-term strategies for preserving those (Franks, 2010). No standard addresses the full range preservation activities. Social media records are known to grow relatively fast in short periods of time so they require large and scalable storage facilities. In addition, governments should ensure that their social media records are indexed to facilitate easy retrieval. Establishing a standard indexing earlier in the archiving process is very crucial to future usability of the records (Thomson, 2016)

4.0 FINDINGS OF THE STUDY

This section deals with presentation of the findings and realities unearthed by the study regarding the status of the management of social media records in the GPO office.

4.1 Legislative, Policy and Regulatory frameworks

The following subsections discuss the significance and influence of the Archives Act No. 5 of 1971, the Electronic Evidence Act of 2009 and the National Records Management Policy of 2012 in the management of social media records in the GPO.

4.1.1 The Archives Act No. 5 of 1971

The Eswatini National Archives (ENA) is a department placed under the Ministry of Information, Communications and Technology. Its operations are governed and directed by the Archives Act No. 5 of 1971. This act is currently under review through the Eswatini National Archives and Records Service Bill of 2020. As it still subsists, it authorises the Director of the ENA to ensure the proper custody, care and filing of archival records regardless of format and including social media records, in government Ministries and Departments. The ENA is also mandated to oversee the inspection and timely destruction of archives and the transfer of archives from government ministries and departments to the ENA national repository (Msibi, 2015; Tsabedze, 2020). The Eswatini National Archives and Records Service Bill of 2020 now incorporates clauses that address the management of records throughout their life cycle as well as electronic records management. The Bill distinctly addresses the issue of records preservation, irrespective of media or format in the context of the Records Continuum Model (ENA, 2020).

4.1.2 The Electronic Evidence Act of 2009

The Government of the Kingdom of Eswatini enacted the Electronic Evidence Act in 2009. The Act caters for the legal recognition of electronic records and their admissibility as evidence. In addition, the act defines an electronic record to be "data that is recorded or stored on any medium in or by a computer system or other similar device that can be read or perceived by a person or computer system, and includes a display, print-out or other output" (Ngoepe & Saurombe, 2016: pp.35). This places social media records well within the boundaries of the meaning of electronic records as delimited by the act. In terms of the stipulations of this Act, electronic records can be accepted as evidence as long as they are relevant and are produced through the acceptable structures (Ngoepe & Saurombe, 2016).

4.1.3 National Records Management Policy of 2012

The records management policy emphasises the need for Government Ministries and Departments to consult the Eswatini National Archives on records and archives management matters as it is mandated by the Archives Act 5 of 1971 and the Circular Memorandum of March 2010 that mandates the National Archives to oversee the records management function across

Government from creation to ultimate disposition of records. It highlights the need to promote compliance with the ISO 15489 records management standard for creation and maintenance of authentic, reliable and useable records regardless of format (ENA, 2012). This also has an implication on the management of social media records which are also produced by the Government of Eswatini in the conduct of its business.

4.2 Social Media Records Management Processes in the GPO

This sub-section entails the findings relating to the records management process relating to the social media records that are generated by the Government Press Office in Eswatini.

4.2.1 Creation and Capture of Records

The Eswatini Government is quite active on social media and actively posts every day. It is available on Facebook (Eswatini Government), Instagram (@eswatini_government) and on Twitter (@EswatiniGovern1) (Figure 2). Social media is used to provide public notices, Covid-19 updates, videos of National interest, and pictures of the different activities in Ministries. All the Arms of the Eswatini Government (Executive, Judicial and Legislative) channel communications to the public through the Government Press Office which is mandated to oversee government's public communications with its stakeholders (the general public, clients, business and diplomatic partners and allies). The office has an Information Technology administrator responsible for posting approved posts and maintains the Eswatini Government website. All Government Ministries forward content that it wishes to be communicated to the Government Press Office for publishing on the social media sites.

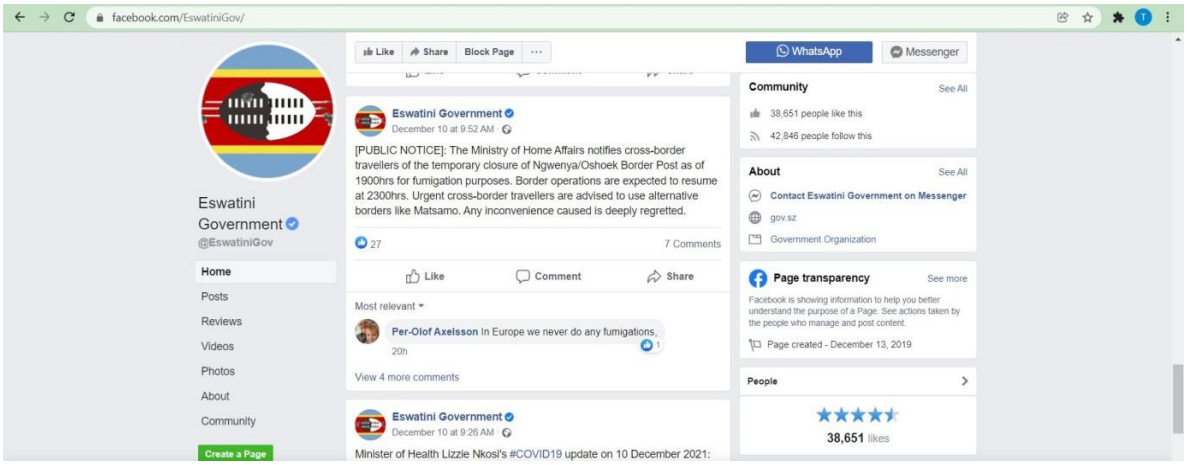


Figure 8: *Eswatini Government Facebook Page showing a public notice.* ***Source:*** *www.facebook.com/eswatinigov*

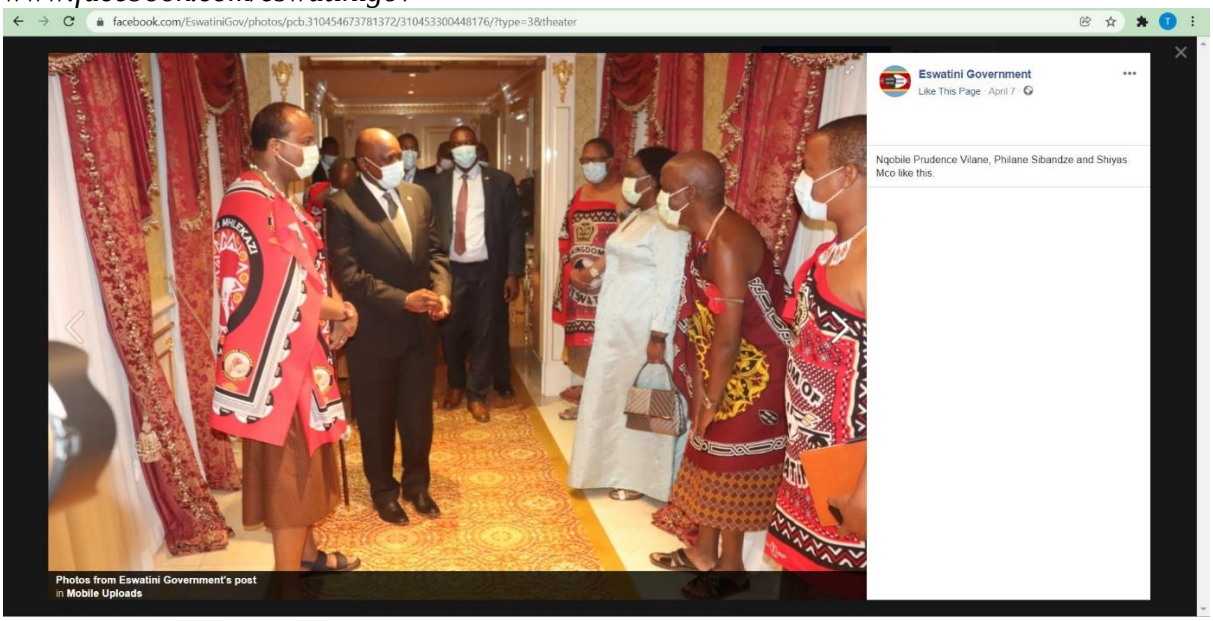


Figure 9: *One of the Photographs Posted on the Botswana's President H. E. Masisi's visit to Eswatini in April, 2021. The photograph is not captioned to give context.* ***Source:*** *www.facebook.com/eswatinigov*

Research has found that most organisations and governments using social media do not capture the consequent content for evidential purposes (Franks, 2010). There is no evidence that shows that GPO captures and preserves their social media content as records. As shown in Figure 4, there are inconsistencies in the descriptions of photographs and videos to provide context to the content. Currently, all the content can only be accessed online through the social media platforms which do not have the capacity to ensure long term preservation of authentic records. Social media platforms do not facilitate proper search and retrieval of the records. Although there is no

evidence that any of the posted content has been lost thus far. It still holds that social media accounts are vulnerable to hackers who can gain access and delete content for example in cases where it can be used as evidence in the court of law. This signal a need to capture and preserve social media records in established records management systems in government as the records show government business (Franks, 2010; Mosweu 2021).

4.2.2 Maintenance, Use and Disposal of Records

Since the social media records are not harvested for selection, appraisal, acquisition, organisation (arrangement), description and subsequent access the Eswatini Government currently keeps everything. Currently, the Eswatini Government keeps everything that is posted. This is a challenge because the Chief Executive Officer and founder of Facebook and Instagram recently published a post to the effect that the company aims at implementing a disappearing messages feature (deleting messages older than 90 days) for one of its social media platforms (WhatsApp) on the premise that 'Not all messages need to stick around forever'. This makes it highly possible for the feature to be implemented in the other platforms owned by the company which puts the social media records at risk. Therefore, a disposal schedule for the social media posts is required to select valuable content for permanent preservation (Griffin, 2021).

4.3 CHALLENGES

Notwithstanding the responsibility vested on the Director of the ENA to ensure proper custody, care and filing of all archival records produced by government Ministries and Departments by the National Archives Act of 1971, the Act does not give guidance on issues of managing electronic records (Msibi, 2015). The associated regulation and guidelines and do not cover the management of electronic records. This is a contributing factor that hampers electronic records management activities including the processes for managing social media records. With regards to the Electronic Evidence Act of 2009, Ngoepe & Saurombe (2016) emphasise and underscore the need for procedures that will ensure integrity of electronic evidence and that the adherence to procedures is vital.

A records management procedures manual was produced in 2012 by the Eswatini National Archives which serves as a tool that guides all government ministries and departments on

appropriate record keeping procedures that are in line with International records management standards such as the ISO 15489. However, this procedure manual is silent on issues of managing electronic records (Msibi, 2015). Without documented procedure, it is challenging to ensure that social media records are captured with proper metadata and can be authenticated and utilised as evidence as per the requirement of the Electronic Evidence Act of 2009 which states that "A person seeking to admit an electronic record in any legal proceedings as evidence has the burden of proving its authenticity by evidence capable of supporting a finding that the electronic record is that which that person purports it to be, except that in the case of an electronic record generated outside the jurisdiction, it shall be sufficient if the record is authenticated in that jurisdiction" (Government of the Kingdom of Eswatini, 2009: pp.3).

Anecdotal evidence shows that the existing file plan does not cater for social media records. In addition, this study found no acquisition policy and retention and disposal schedule for social media records at GPO. This is despite an advice by Ngoepe & Saurombe (2016) that there is a need to consider the fact that for records to be admissible they have to be created and managed during the normal course of business which cannot be possible without the aforementioned records management controls. Another challenge is that Tsabedze (2020), in a study that included the Cabinet and Private Ministry where the GPO is situated, disclosed that records staff lamented the lack of training of records and Information Technology officers on electronic records management in government ministries and departments. These challenges hinder the capture and preservation of social media records which is against the spirit of the Archives Act No. 5 of 1971, the Electronic Evidence Act of 2009 and other records management regulatory guidelines to ensure long-term preservation and access to authentic records in government.

5.0 RECOMMENDATIONS

- **REGULATORY FRAMEWORK:** The weak legislative framework for the management of electronic records and in extension, social media records is an indication that the ENA needs to expedite the processes of enacting the ENARS Bill 2020 into an Act. The ENA also should facilitate the development of procedures for managing

electronic records including social media records in government. In addition, records management reforms including the NRMP 2012 should be revised so that they cater for the management of social media records. A strong legislative framework is a good basis for the capture and preservation of electronic records necessary for processes such as e-discovery.

- **MANAGING SOCIAL MEDIA RECORDS:** As this study has found that there are less efforts by government in Eswatini to capture and manage social media records, the Eswatini National Archives needs to take an active role in raising awareness on the importance of social media records as they constitute social memory and provide digital preservation training for staff. Smallwood (2013) also emphasises the importance of top level management support in a records management programme therefore the GPO has to strengthen top-level management resource mobilisation for sufficient resources of the management of social media records. In order to ensure capture, sharing and storage of social media records the GPO should implement the OAIS Reference Model, beginning with securing the necessary infrastructure. It is crucial for the GPO to liaise with the ENA so that any interventions are in line with applicable laws and standards.

- **CHALLENGES:** Considering challenges found in this paper, the GPO needs to develop social media records policy, update its file plan to include social media records and create an appraisal guideline for disposing social media records and arranging and describing them for long-term preservation and access. Lastly, the Office should establish an internal records procedures manual for processing, organising and management of social media records and provide backup for social media records.

6.0 CONCLUSION

The study investigated the status of the management of social media records at the GPO office in Eswatini. It was discovered that the Archives Act of 1971, the National Records Management Policy of 2012 and the Records Procedures Manual of 2012 all lacked the comprehensive and much needed guidance for ministries and departments to manage electronic records, which

include social media records. The study found out that there is lack of proper capture of social media records and lack of training for both the records and IT staff. The study recommends the ENA should create an enabling legislative environment. The GPO should strengthen top-level management resource mobilisation, develop social media records policies and guidelines and implement the OAIS reference model for the proper management of social media records. Proper preservation of social media records constitutes a social good for the benefit of citizens of Eswatini. They therefore need to be recognised and be properly managed as official records for posterity, access and compliance to both records management and legal requirements. The government of Eswatini needs to appreciate the importance of the social media records that are produced during its business activities and establish a robust programme for managing such records as per the recommendations of the study.

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DATA PROTECTION WITHIN 4IR: OPPORTUNITIES AND CHALLENGES FOR RECORDS MANAGEMENT IN AFRICA

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Abstract
This paper explores the impact of the fourth industrial revolution (4IR) on data protection in records management. It argues that 4IR technologies such as the blockchain, internet of things, cloud computing, and artificial intelligence are present in records management. Specifically, the paper explores the opportunities and challenges brought by 4IR technologies in data protection and record management in Africa. The study adopted a qualitative approach to review the literature on technologies endorsed in records management and the opportunities and challenges of adopting 4IR to data protection, using published book chapters, journals, conference proceedings, journal articles, and reports. The study found that the adoption of 4IR offers potential benefits such as improved security of records, enhanced data protection, and risk mitigation. The study also found that embracing 4IR technologies in records management presents security, privacy, and data protection challenges for records managers. The paper recommends several solutions to records managers, such as a review of legislation concerning data protection and the inclusion of data protection requirements into 4IR technologies to improve data protection.

Keywords*: data protection, fourth industrial revolution, records management, 4IR*

INTRODUCTION

*G*lobally, societies have witnessed a drastic shift in technological advances from the first, second, and third industrial revolutions to the fourth industrial revolution, characterized by the fusion of technologies (Tella, Olaniyi, & Dunmade, 2021). Popularly known as the 4IR, Tella, Olaniyi, & Dunmade (2021), describe this revolution as the new era that builds and extends the impact of digitalization in new and anticipated ways. The 4IR is noticeable by the use and application of technologies such as artificial intelligence (AI), blockchain, the internet of things (IoT), robotics, cloud computing, biotechnology, and others (World Economic Forum, 2018). A recent report from the World Economic Forum reveals that organizations have embraced these technologies to improve productivity and service delivery within the workspace. In 2016, the World Economic Forum (2018) reported that more than 50 billion devices connect to the internet. Lanka (2019) estimates that the amount of data created will increase exponentially because of 4IR technologies.

Amidst the above developments, several scholars concede that, compared to other continents such as Europe, Africa is lagging in embracing 4IR technologies (Adesina, 2019; Markowitz, 2019). Mamphiswana & Bekele (2020) hold that African countries do not have well-defined policies that equip organizations with the necessary skills to exploit 4IR technologies. On the other hand, Markowitz (2019) argues that the lack of core legislation and policies on information and communication technology (ICT), cybersecurity, and data protection are some of the factors that affect countries in the South African Development Committee (SADC) in harnessing 4IR technologies. However, with the growing number of economic activities and business functions, organizations in the African context cannot afford to miss opportunities brought about by 4IR. Consequently, this has led to African countries buying into the narrative on embracing 4IR technologies. For example, in Cameroon, the Bonassama part of the country hospital used Sophia's Artificial intelligence in health care (Markowitz, 2019). In Uganda, organizations have adopted blockchain to transport goods (Markowitz, 2019).

However, with the proliferation of 4IR technologies elsewhere and in Africa, the records management landscape is constantly evolving as organizations shift from traditional records management to digital practices. These changes require records managers to be constantly aware of the risks of keeping digital information (Tella, Olaniyi, & Dunmade, 2021). That is because technologies such as the internet and social media menace information security challenges (Rajoo, 2020). Some of these risks include authorized access, theft, and the unlawful use of information classified as confidential and sensitive (Masilela & Nel, 2021). Tella, Olaniyi, & Dunmade (2021) acknowledge that the transition to 4IR in records management has been patchy, especially for organizations struggling to manage electronic records. That has sparked an interest in data protection issues. Although challenges brought by 4IR technologies in records management exist, literature on how 4IR technologies impact data protection in the African context is scant and fragmented. Therefore, this paper explores the challenges and opportunities resulting from 4IR technologies on data protection within records management in Africa.

CONCEPTIONS OF DATA PROTECTION

It is imperative to acknowledge that data protection is not a new concept in records management (Makulilo, 2012). It is often referred to as the right to privacy because the protection of personal information is a fundamental right to privacy (Blume (2015). Makulilo (2012; 2021) agrees that privacy and data protection are interchangeably used depending on the context. For instance, privacy is popular in the USA, and data protection is popular in Europe (Makulilo, 2012). According to Blume (2015), data protection refers to securing individuals' data. Precisely, personal data is safeguarded based on the fundamental right to privacy by regulating its processing and proving individuals' rights over data (Phillips, 2020). Makulilo (2012) mentions that the first European Directive 95/46/E6, a data protection law, shaped the development of data protection and privacy laws. Since then, the interest in data protection laws has grown because organizations have embraced 4IR technologies in the 21st century, where privacy is instrumental (Lanka, 2019). Before 2022, over 120 countries had enacted privacy and data protection laws (Thales, 2019). The last decade, 2010-2019, saw a record of 62 countries enacting data protection laws (Greenleaf & Cottier, 2020). These legal advances include the United Kingdom (UK) 2016 General Data Protection Regulation (GDPR) to safeguard personal data from unlawful handling, processing, and access.

In Africa, the interest in data protection is gaining momentum due to pressure to meet international trade requirements and fulfill the fundamental right to privacy. At the continental level, the African Union established the 2014 Cyber Security and Personal Data Protection Convention, which is a data protection framework (Makulilo, 2018; 2021). At the regional level, the Southern Africa Development Committee (SADC) developed a law on data protection to provide insights to affiliated countries (Makulilo, 2012). Nationally, Greenleaf & Cottier (2020) report that governments are in a rush to enact privacy legislation. For example, South Africa passed the South African Protection of Personal Information Act (POPI) of 2013 to protect information about individuals. Congo-Brazzaville passed the 2019 *portant protection des données à caractère personnel* (data protection legislation) (Greenleaf & Cottier, 2020).

In the management of records, data protection is becoming more relevant globally with the continued rise of 4IR technologies (Lanka, 2019 and Bhatia, Douglas, & Most 2020). Lappin (2020) shares how records management has changed because of the 4IR. Lanka argues that the volume of data generated will grow tremendously, stressing the importance of data protection for records managers. Records management is defined by ISO 15489-1:2016 as the field responsible for the creation, documentation, management, use, and disposition of records systematically. It involves a systematic process where data is captured about actions, decisions, and activities, then stored as a record. Historically, records have been instrumental in good governance, accountability, and transparency as tools that provide evidence (Sebina, 2005; Ngoepe & Keakopa, 2011). As such, they need to be secure, specifically electronic records. Though records are kept safe through existing statutory requirements in many countries, citizens' data is still vulnerable to massive cyber-attacks placing data records in danger of being altered and destroyed (Lanka, 2019).

STATEMENT OF THE PROBLEM

Despite the desirable benefits of fourth industrial revolution technologies, the challenge that prompted this study is that records managers in Africa are grappling with data records security because of 4IR technology integration, which raises data protection and privacy concerns (Research ICT Africa 2013; Dahiru & Abubakar, 2017; Abubakar et al., 2014). This challenge has long been reported, most notably by Asogwan (2012), who stated that e-records administration was a challenge for African organizations. For example, it has been reported in Ethiopia that firms that have embraced cloud computing are concerned about security, privacy, and trust challenges because of the country's lack of adequate data protection legislation (Seifu et al., 2017). According to Mamphiswana and Bekele (2020), African countries fail to tackle data protection issues where 4IR technologies are present due to inadequate security policies and a data protection legislative framework. Concerns about information privacy have repercussions for records management (Beckles, 2014). These include, among other issues, loss of trust, violation of privacy, and litigation. According to Denton &Pauwels (2018), this problem has given been less attention, stressing the need for records managers to recognize the significance of data protection within the 4IR.

OBJECTIVES OF THE STUDY

The main purpose of this study was to investigate the impact of 4IR technologies in data protection within records management.The specific objectives of the study were to:

1. establish the extent to which 4IR technologies have been adopted in records management in Africa
2. determine the opportunities of 4IR technologies in data protection to records management in the context of Africa
3. identify the challenges of data protection within 4IR to records management in Africa

METHODOLOGY

The study adopted a qualitative approach to collect data by reviewing the literature. Mudavanhu & Zezekwa (2017) describe a literature review as the selection of available documents (both published and unpublished) on the topic of interest that contain ideas and evidence written from a particular viewpoint. This method was used in line with studies by Masenya 2020); Dahiru & Abubakar, 2017; Mosweu, Luthuli, & Mosweu 2019), which adopted this method to review 4IR technologies such as cloud computing, among others, concerning records management. The documents and scholarly publications on data protection in the 4IR, such as journals, books, reports, and articles, were retrieved and reviewed from academic databases, websites, and the library collection. Data collected was analysed through a content analysis for interpretation.

FINDINGS OF THE STUDY

This paper presents the findings on data protection within the 4IR in relation to records management in Africa. The findings are presented in line with the study objectives.

1. The extent to which 4IR technologies are adopted in Records Management

The first objective was to identify the 4IR technologies used in records management in Africa. The findings reveal that organizations have embraced 4IR technologies in records practice to improve their records management practices. Some of the 4IR technologies include blockchain, cloud computing, the Internet of things, and artificial intelligence. Records managers exploit

these technologies by implementing them in their practice. **The** mentioned 4IR technologies are explained in detail hereafter.

1.1 Blockchain

Blockchain has emerged as one of the fourth industrial technologies used in records management. According to McGinnis (2020), blockchain is a secure and decentralized means of recording and sharing data that does not require the use of third-party software. Mosweu & Chaterera (2021) acknowledge the presence of blockchain records. For instance, developed countries like the United Kingdom (UK) employ Blockchain technology to manage electronic records. Africa does not have concrete cases on the use of blockchain technology in literature. Owing to this, African governments are still lagging with their integration of Blockchain technology in record management due to a lack of knowledge and understanding of the technology and infrastructural issues (Mosweu & Chaterera, 2021.). For example, In Botswana and Zimbabwe, Mosweu & Chaterera (2021) acknowledge that organizations in both countries are not aware of bblockchains.

1.2 Cloud computing

According to the Provincial Archives of Saskatchewan (2016), cloud computing involves using internet servers for record storage, management, and processing throughout the life cycle. The Provincial Archives of Saskatchewan (2016) further explains that cloud computing enables record managers to access information in the cloud using internet browsers or any other standard cloud computing software. Most clouds can safeguard data using security techniques such as password encryption (Bhatia, Douglas, & Most, 2020). Cloud computing services currently used in Africa include email services, SharePoint, and Google applications (Dahiru & Abubakar, 2017). Despite this, Mosweu, Luthuli, & Mosweu, (2019) hold that the adoption of cloud computing services is still in the initial stages in Africa. In support, Mosweu & Chaterera (2021) underscore that public records managing organizations are still trailing behind in embracing technology adoption because they are not aware of disruptive technologies. For example, in South Africa, the government is still struggling with manual paper-records challenges due to the lack of a framework for managing digital records in the cloud (Shibambu & Marutha, 2021).

While this is the case, some variations in the literature indicate evidence of the use of cloud computing technology in Africa. For example, in Zimbabwe, the Zimbabwe Open University uses cloud services such as online creation, storage, and backup solutions to carry out records management practices (Tsvuura et al., 2021). In Kenya, Kibe (2019) asserts that many public organizations in Kenya are adopting cloud computing services to manage electronic records.

1.3 Internet of Things (IoT)

The internet of things, also known as "IoT," is the most popularly exploited fourth industrial revolution technology in records management. IoT refers to everyday gadgets that connect through a network (McGinnis, 2020). These include computers, mobile devices, and other similar technologies that fall within this category. These things can send and receive data through the internet (Rouse, 2019). Masenya (2020) relates that records managers have embraced this technology because it has prominent levels of security for documents and the ability to declare records as confidential and prevent authorized access. Several studies report the adoption of IoT technologies within records management in Africa. As identified by Balogun et al., (2019) Irolin businesses in Nigeria have adopted technologies such as Electronic Document Management Systems (EDMS) and Electronic Document Records Management Systems (EDRMS) for improved records management. In Botswana, The Ministry of Investment, Trade, and Industry (MITI) implemented the Document Workflow Management System (DWMS) to improve service delivery (Mosweu, 2020). In South Africa, municipalities continue to adopt Free and Open-Source Software (FOSS) to manage electronic records (Shekgola, Maluleka & Rodrigues, 2021).

1.4 Artificial intelligence

As we look at the world today, we are already in a society of predictive applications powered by artificial intelligence. According to Denton & Pauwels (2018), AI refers to the application of digital technology to create systems capable of performing tasks that require intelligence. RecordPoint (2018) describes a variety of AI methods that are already present in the records. Automated classification, machine learning, natural language processing, black box, and automated rules (RecordPoint, 2018). Due to the technology's complexity, the inclusion of these

methods into records management has not been as easy as anticipated. A study by Gwagwa et al., (2021) argues that Africa is still at an infant stage of exploring and integrating AI into records management. This justifies the lack of literature on AI adoption within records management in the African periphery. Furthermore, Duranti (2020) argues that records managers have struggled to develop strategies and methods to pave the way for the adoption of AI in records management in Africa.

2. BENEFITS OF 4IR TECHNOLOGIES IN DATA PROTECTION TO RECORDS MANAGEMENT

The second objective (2) sought to identify the potential opportunities of embracing benefits 4IR technologies under subject in data protection to records management. The literature findings reveal that 4IR technologies contribute to data protection in record management. Several writers have noted benefits, such as increased record security, data protection, and risk mitigation (Tella, Titilola, Olaniyi, and Dunmade, 2021; Mosweu, Luthuli & Mosweu, 2019; World, 2018; Hiem, 2018). The benefits of 4IR technologies in data protection are thoroughly discussed below.

2.1 Improved security of records

Data records created, managed, and stored using 4IR technologies are always subject to security challenges. On a positive note, organizations that embrace 4IR technologies will unquestionably benefit. These benefits include improving the security of data records, hence eliminating the chances of them being destroyed or damaged (Tella, Olaniyi, & Dunmade, 2021). In the same vein, Bhatia, Douglas, and Most (2020) maintain that organizations that use 4IR technologies have an advantage in securing data through 4IR security features. Concerning cloud computing, Mosweu, Luthuli, and Mosweu (2019) argued that data stored in the cloud is secure because cloud servers are intact and safe from physical accidents or disasters. To add to this, Masenya (2020) explains that blockchain technology can encrypt data records and ensure that only data owners have control of their data. Therefore, it is apparent that 4IR technologies are critical tools to ensure the security of data records.

2.2 Enhanced data protection

Literature reveals that integrating 4IR technologies into records management can enhance data protection (Mosweu, Luthuli, & Mosweu, 2019; World, 2018). To illustrate, IoT technologies such as Document Management Systems (DMS) can support document management processes by facilitating document location and ensuring that security standards are followed (World, 2018). As such, any change to the data can be traced and documented for system evaluation (World, 2018). Furthermore, Data protection could be enhanced by allowing organizations to store their digital data on their private blockchain and control who has access to it. As such, the data would be decentralized and within their control. Data protection would be enhanced with blockchain, as individuals would have secure control over their data. Concerning AI, World (2018) observes that data records can be classified into confidential and sensitive records and assign high-security levels to documents, thus protecting data against authorized users.

2.3 Mitigation of risks

The fourth industrial revolution technologies help to reduce privacy threats and mitigate data privacy breaches. IoT technologies such as Electronic Document Management Systems (EDMS) can protect data with password security. Therefore, this mitigates the impact of any potential destruction or authorized access to data. Hiem (2018) backs up this claim by claiming that employing IoT technology to preserve records assures that there is no breach of privacy, reducing concerns about lawsuits caused by privacy breaches or the modification and disclosure of personal information. In addition, the use of 4IR avoids the loss of personal data, which is critical for accountability in the organization. Equally important, organizations that take advantage of 4IR technologies are likely to incur fewer costs in events of litigations as they have records as evidence.

3. CHALLENGES OF DATA PROTECTION WITHIN THE 4IR TO RECORDS MANAGEMENT

Despite the benefits of 4IR in data protection to records management, these technologies have also brought challenges to data protection for managing organizations. The issues will be discussed more below.

3.1 Security concerns

Literature findings highlight records security as a concern for records managers in Africa (Research ICT Africa, 2013; Dahiru & Abubakar, 2017). The capability of 4IR technologies such as IoT to capture and share data records in digital form carries a greater risk of data tempering (Mitrovic, 2020). Furthermore, Rouse (2019) underscores that IoT technologies are always vulnerable to attacks, hence the continued data security concerns in records management. For example, a hacker can exploit the vulnerability to manipulate all the data, rendering it unusable. A study conducted at Moi University on e-records security management in Kenya reveals that records security is a challenge (Musembe & Mutala, 2021). In their findings, Musembe and Mutala (2021) report that hackers have invented new ways to tap into new 4IR technologies to steal and corrupt e-records. Besides IoT technology, data records stored in the cloud are also vulnerable to authorized access (Kibe, 2019; Mosweu & Chaterera, 2021). These are common in organizations where data records are stored in a public cloud rather than a private cloud. Kibe (2019) stresses that data records saved in the public cloud will remain vulnerable to malicious manipulation.

3.3 Privacy and confidentiality

The advent of fourth industrial revolution technologies, for instance, cloud computing and IoT, that allow large volumes of information to be stored remotely, can, in turn, affect information privacy as sensitive and classified data can be exposed to authorized users (Bassett & Kelly, 2018). Data in an automated environment is prone to cyber-attacks, including hacking and virus attacks, which are external threats to data (Beckles, 2014). The exposure of sensitive and classified data records raises privacy concerns as the data records are unlawfully handled, processed, and used. Beckles (2014) argues privacy breaches have implications for record management, including litigation, costs, and loss of trust. In support, Ngoepe, Mokoena & Ngulube (2010) share that government departments deal with unnecessary financial losses due to litigation resulting from invasions of privacy in South Africa. Furthermore, the exposure of confidential information affects the core values of accountability and good governance, which are imperative in democratic states.

3.3 Lack of sufficient data protection legislation

The application of relevant legislation and regulatory frameworks in the management of records can help safeguard the confidentiality and privacy of records (Marutha, 2018). However, literature findings reveal the absence of appropriate data protection legislation is a challenge in Africa (Yedaly & Wright, 2016; Research ICT Africa, 2013). This challenge is present in countries such as Lesotho, Eswatini, and Tanzania, where data protection laws are not present to secure data. The existence of data protection laws in organizations provides an opportunity for enhanced data protection, particularly in the 4IR environment. In countries like South Africa, Nigeria, Botswana, and Ethiopia, where data protection legislation exists, records-managing organizations still face challenges because most of the data protection legislation is not well integrated into records management. Most data protection legislation fails to address the integration of 4IR technologies, how data in the cloud, blockchain, or IoT systems needs to be protected. For instance, in the case of South Africa, the Protection of Personal Information Act (No.4 of 2013) fails to address legal concerns regarding the storage of personal information on various clouds (Mohlameane & Ruxwana, 2020). The authors further explain that there are concerns with the POPI as it does not provide clarity concerning the protection of information where 4IR technologies are present. In Botswana, Mosweu (2021) argues that the Botswana Data Protection Act of 2018 seems to have been crafted without considering issues specific to records generated in cloud environments such as social media.

3.4 Loss of control over data

Bhatia, Douglas, & Most (2020) point out that records management systems can be attacked by viruses that corrupt electronic documents, leading to complete loss of data. Teixeira et al. (2019) identified other ways in which information can be exposed. This entails false data injection, where an authorized attacker can take control of the system, manipulate it, and inject false data into the system, thus compromising the security of the system. Another way is through a data breach, where authorized users can access the system and manipulate data. Offsite backup can ensure that data records are safe regardless of system manipulation and failure. IoT technologies' hardware and software failure may also affect the readability of data on document management systems (DMS). This results in the complete loss of data records. To add to this, (Bhatia,

Douglas, & Most, 2020) argue that although blockchains can protect data through encryption that has a key, the data is at considerable risk of being lost once the key is lost.

RECOMMENDATIONS

Given the benefits and challenges of 4IR technologies in data protection within records management, the study suggests the following solutions for improving data protection.

- Based on literature findings that reveal the lack of adequate and concise legislation that guides the implementation of 4IR technologies in records management, the study recommends the development of data protection and privacy laws. In instances where data protection laws exist, they must be revised to complement 4IR technologies. Lanka (2019) opines that data protection laws need to keep up to date with new advancements in technology to be effective. Records managers must understand that 4IR technologies are constantly changing, and it is their responsibility to find ways to integrate data protection requirements into records management.
- Secondly, the study recommends organizations develop security policies to protect data. These policies should be aligned with records management policies and should address the practices of data handling, usage, storage, and validity. In support of the above claims, Masenya (2020) recommends that appropriate authorization policies and rules are necessary within a 4IR landscape to ensure that only authorized users have access to confidential data.
- Thirdly, the study recommeds that records managers to establish private storage areas. These include private clouds and private blockchins. As such, data can only be accessible to authorised users as private locations limit access through data security definitions that allow access to only authorised personnel.Fourthly, records managers need to be equiped with skills on 4IR intergration into records management. This would help them assess the functionalities of 4IR technologies against the required records management functions and in the process apply best practices to protect data
- To add to this, the study recommends records managers to keep to learning more about 4IR technologies because they are likely to change in future practice. That prepares them for a better application of 4IR technologies to enhance data protection.

CONCLUSION

The use of 4IR technologies in records management calls for data protection because of enormous amounts of data created. The influence of 4IR technologies on records management has been felt in the same way that it has been seen in other areas of management. Globally, records-management firms have adopted 4IR technologies such as blockchain, artificial intelligence, the internet of things, and cloud computing. The study demonstrates that implementing these technologies benefits data protection within records management in the following ways: increased data security, data protection, and risk avoidance. The studies also highlighted that the deployment of 4IR technologies in records management provides a data protection problem since it exposes sensitive and classified data and introduces security concerns, among other things. Furthermore, this study recommends the development of security measures, enactment of data protection laws and privacy laws to improve data protection

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RECORDS MANAGEMENT AND COVID – 19: WHAT LESSONS HAVE WE LEARNT?

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Abstract
If there is any event in recent times that has impacted the entire world, then it must be the COVID-19 pandemic. The COVID-19 pandemic has had no mercy to developed as well as undeveloped countries. It has caused immense suffering and loss of life in virtually all the countries of the world. A key organizational aspect that has been impacted by COVID-19 relates to access to organizational records and archives. Organizations both public and private were compelled to suspend their records and archives management activities This paper therefore sought to understand how records and keeping institutions responded to the COVID-19 pandemic and the lessons that they learnt from this pandemic. This paper is based on a review of literature on records and archives management during the COVID-19 pandemic period. The goal was to identify records management challenges experienced during the COVID-19 pandemic and the lessons that were learnt from this pandemic. The major finding of the survey indicates that most organizations were unprepared for the COVID-19 pandemic and had to suspended their records management activities except those which had stored their holdings in the cloud. Those which allowed their staff to work from home have experienced gaps in their records keeping systems The key recommendation arising out of the survey suggest that traditional records management require a fundamental shift in embracing information communication technologies which offers alternative ways when access to physical records is not possible.

Key words: *Disasters, Records management, COVID-19. .*

Introduction

The COVID-19 pandemic has impacted organizations in different ways. For some the pandemic has presented unprecedented challenges while for others the pandemic has provided opportunities for exploring new and innovative ways of delivering archives and records management services in a manner that ensures continuity of access to the vast amounts records and other information resources held in both public and private sector organizations. Due to frequent local downs, most organizations have had to suspend their operations, limit the number of staff working in the key function areas while others were permitted to work from their homes. Perhaps one of the key areas where the impact of COVID-19 is noticeable relates to the management and utilization of records in the organization. For archival institutions, access to archives was suspended completely as users were not allowed to visit the Archives. A major

issue that immediately arises is how are organizations able to provide access to records and archives held in their organization. This kind of scenario raises several questions such as:

(1) How can informed decisions be made without the benefit of access to institutional memory held in vast quantities of paper files?
(2) In those cases where staff have been allowed to work from home, what measures were put in place in order to secure official records which officers may need to work with in their homes?
(3) How was staff working from home able to share the records via fax, email or send large documents from home?
(4) How was staff working from home able file records to the institutional filing systems?
(5) What gaps are being created in the organizational records keeping systems as a result of the work from home policies that were adopted?

Disasters

All organizations, whether public or private are prone to disasters. How organizations respond to disasters largely dependents on how prepared they are for such calamities. The International Federation of the Red Cross (2022) asserts that "Disasters are serious disruptions to the functioning of a community that exceed its capacity to cope using its own resources". According the International Red Cross (2022), disasters may be categorised into the following categories:

(a) Geophysical: a hazard originating from solid earth (such as earthquakes, landslides and volcanic activity)
(b) Hydrological: caused by the occurrence, movement and distribution of water on earth (such as floods and avalanches)
(c) Climatological: relating to the climate (such as droughts and wildfires)
(d) Meteorological: relating to weather conditions (such as cyclones and storms)
(e) Biological: caused by exposure to living organisms and their toxic substances or diseases they may carry (such as disease epidemics and insect/animal plagues). The International Federation of the Red Cross (2020) makes a clear distinction between epidemics and pandemics pointing out that "Epidemics are an unexpected, often sudden, increase of a specific illness within a community or region. Pandemics are when an epidemic occurs worldwide, crossing international

borders and affecting a large number of people. A number of communicable diseases can be significant health threats at the local, regional and global level and lead to epidemics or pandemics."

Mami Mizutori, (2020) the Special Representative of the Secretary-General for Disaster Risk Reduction, United Nations Office for Disaster Risk Reduction argued that "Disasters result when a natural or man-made hazard affects a human settlement which is not appropriately resourced or organized to withstand the impact, and whose population is vulnerable because of poverty, exclusion or socially disadvantaged in some way". He went on to state that "Unfortunately, there are many risks in our contemporary world, including poverty and inequality, environmental degradation, rapid and unplanned urbanization, weak building codes, population growth in hazard-exposed areas and the spread of zoonotic diseases such as COVID-19. What COVID-19 has laid bare is that all these multiple risks are connected, and their impacts are cascading." Based on the above definition of disasters, it cannot be overstated that the outbreak of Codi-19 falls into the category of disasters whose impact has been across the globe. COVID-19 has shown that it does not respect boundaries and neither does it differentiate between the rich and the poor. Its consequences are the same everywhere – untold pain, loss of life and disruptions of virtually all organizational activities including records and archives management activities. Hence, COVID-19 should be seen and is a biological disaster

Records Management

Records play a critical role in the operations and performance of organization. Both public and private sector organizations rely of records and archives for the execution of their day to day activities. Timely access to organization records ensures that informed decisions are based on reliable and accurate information. Records may be defined as documents regardless of form or medium created, received, maintained and used by an institution (public or private) or an individual in pursuance of legal obligations or in the transaction of business of which they themselves form a part or provide evidence (ISO 15489-1: 2001). A record may include a report, fax, e-mail message, telex, telegram, internal memoranda, photograph, compact discs, videos, sound recordings or films. They may also include registers, ledgers, architectural or engineering drawings (maps) and computer printouts. In most organizations, paper documents or files are the most prevalent form of record. The records may be handwritten, typewritten or printed.

Penn, Coulson and Pennix (1994:5) asserted that "records management is the management of any information captured in reproducible form that is required for conducting business". ISO 15489, The International standard on records management defines a record as: "information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or in the transaction of business" (International Organization for Standardization, 2001a). The standard itself defines records management as:

> the field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use, and disposal of records, including process for capturing and maintenance of and information about business activities and transactions in the form of records (ISO 15489-1:2001(E)).

Yusuf and Chell (2005:129) posit that "records management, a relatively new branch of information management has proved to be successful in developed countries, where such sytems can maximise production and the exploitation of resources and contribute substantially to development". Records management needs to be viewed within the wider context of information management. Records management forms part of the broader field of information management. It is concerned with the capturing of information created or received in the organization, providing timely access and retrieval of information, and in ensuring that the information is protected and retained for as long as it is needed to support organizational activities. Records constitute a vital organizational resource which provides evidence of its activities over time. Additionally, records document corporate policies, decisions and actions. Traditionally records management was seen as that area of general administration which is concerned with achieving efficiency in the creation, maintenance and use and disposition of records. Robek, Brown and Stephens (1995), identified ten *business reasons for records management in* organizations. They argued that a good records management programme is necessary as it helps in:

i. Furnishing accurate, timely, and complete information for efficient decision making in the management and operation of the organization in a costly manner;
ii. Processing recorded information as efficiently as possible.
iii. Providing information and records at the lowest possible cost.
iv. Rendering maximum service to the users of records and in ensuring the secure storage of vital records which are essential to resuming operations in the event of disaster.

v. Ensuring periodical legal disposal of records no longer needed to support the current business of the organization as well as ensuring the preservation of archival records.

vi. Assimilation of new records management technologies such as the use of micrographics, automated data processing and other information management techniques.

vii. Ensuring regulatory compliance and minimization litigation risks.

viii. Supporting better management decision making and the preservation of the corporate memory as well as fostering professionalism in running the business.

Today records are viewed as a key strategic resource necessary for strategic planning, a tool used to fight corruption, enable citizens to hold their institutions accountable and transparent and as a means of ensuring the protection of rights and entitlements by the citizens. Without records it is virtually impossible to hold those in authority accountable for their actions. Records also provide audit trails of who did what and when. An understanding of records management has to begin with knowledge of what organizations do. This is because records are not created in a vacuum. They are by-products and evidence of activities and transactions which form part of the business process.

COVID 19 AND RECORDS MANAGEMENT

The COVID- 19 Pandemic has had unprecedented impact on organizations. Ayassa (2020) in a study entitled *Records Management During COVID-19: The Real Challenges Managers Face* observed that during the COVID-19 pandemic managers in Australia faced some of the following problems:

(i) Many Australian government agencies were not operating in a cloud environment, which of course became a huge thing when those organizations needed to be able to quickly enable those who had to work from home.

(ii) Only 31% had migrated to cloud-based applications, although 39% were on their way.

(iii)The significant reliance on paper records. In one organization it was reported that "An entire department could not be deployed to work from home because they would lose access to basically all their information! There would be no way to digitize the

volume of content in the timeframe available, so everyone had to keep coming in each day."

(iv) Some teleworking employees may find that they use personal email accounts or other electronic messaging applications, like text messages or messaging apps within social media or video conferencing tools, to communicate for work."

Millward (2021) observed that COVID-19 had impacted organizations in numerous ways. He argued that:

> The effect on employment can also be seen in the way people work. Jobs that were previously carried out in offices for years are now being done remotely (where possible), resulting in businesses and employees having to adapt the way they work. Tasks that previously would have taken minutes could now take much longer (for example, printing a document and handing it to a colleague) and things previously taken for granted (colleagues in the office to ask a quick question to, in-person collaboration needed for creativity etc) may not be as readily available or easily done. However, during all the changes and uncertainties that this last year has bought, the benefits of an automated document management system have been emphasized. Businesses and employees were suddenly faced with challenges to complete routine processes whilst working from home. An example of this is that supplier invoices which were usually posted to your office no longer had anyone to receive, scan them in and process them. The ease a system brings to day-to-day duties and the overall benefits of the streamlining of business processes have been amplified.

In as much as COVID-19 has brought about records management challenges, it has also created opportunities for organizations to benefit from the use of Information communication technologies especially the adoption of document management systems. Arguing in support of document systems, Millward (2021) posited that document management systems offers organizations 3 key benefits, which include:

(a) Document Access: According to Millward (2021) the introduction of electronic Documents and Records management systems removes "the reliance on paper decreases as these systems can capture, store, and retrieve documents. This is a huge benefit when working remotely as this lets business processes carry on as usual without disturbance, even without physical access into the office." Millward (2021) emphasized that "With less reliance on paper-documents, this also reduces physical space taken up by filing cabinets, reducing storage costs associated with retaining paper documents."

(b) Easy of Collaboration: Millward (2021) posited that one of the benefits to be derived from the adoption of document management systems is that "Using a document management system can make sharing information simpler. Documents can be captured from different sources (customers, suppliers etc) and can be accessed by multiple internal employees, meaning information can be accessed instantly".

(c) Increased Security: Millward (2021) stressed that COVID-19 had created opportunities for increased use of electronic document management systems which offered security to organizations held information. He emphasized the fact that "Document management systems reduce the occurrence of physical security breaches. With respect to sensitive information, storing this in a secure network can stop this information getting into the wrong hands, including office break-ins or even accidentally by employees. These systems can also leave an audit trail of who viewed a document and when, and record if anything was modified, providing further control".

Maryland Department of General Services observed that "The COVID-19 pandemic represents an extraordinary event in global history and we at the Maryland State Archives and State Records Division are working to ensure that we do our best to ensure that you and your agency understand the importance of maintaining records during a time of crisis".

Hanna and Siegrist (2021) emphasised the need to address several questions relating to records management during the COVID-19 pandemic in Texas City, USA. They raised serious questions which demand answers during this pandemic. The questions are:

1. How should Texas government offices capture and maintain records created while staff are teleworking during the COVID-19 pandemic?
2. If a Texas government office is using Microsoft Teams, Skype for Business, Zoom, or another video conferencing platform to communicate with one another, do these tools need to be scheduled?
3. If employees print at home, are those printouts government records?
4. Are employee medical records related to COVID-19 covered by a retention schedule?
5. Will TSLAC be issuing a retention series to cover COVID-19 records?

6. Can offices apply their disposition authorities for disaster response, incident response, or pandemics to records related to responding to COVID-19? Does it require a modification to the schedule?
7. Are records related to COVID-19 permanent?
8. With the scale of COVID-19, will government offices need to keep employee health records and office response and planning records longer than they are currently scheduled?
9. Should records related to COVID-19 be kept in case of possible litigation?

The above questions are not only relevant to Texas organizations, but to all institutions creating and keeping records. Unfortunately, the surveyed literature does not provide consistent answers related to them.

In seeking to address records management challenges brought about by COVID-19, the New York State Archives in its guidelines on Records Management and Remote Work advised its staff to observe the following procedures with regard to records and archives *stressed that:*

- Any records created or received on any device might be a public record. This includes use of personal email accounts to conduct official business.
- You must maintain, store, and preserve all government records created or received in the course of official business no matter where you work.
- When using cloud storage or collaborative platforms (i.e. Office 365 or Google Drive), establish directories and files so that records can be stored safely and efficiently retrieved. Create a logical set of folders, metadata, and file names that help you know where to store and retrieve records.
- Remember privacy considerations and store records appropriately. Avoid saving records with sensitive information to personal devices and be cognizant of the location of any printed materials.
- Avoid multiple copies. Be conscious about what you're putting on a personal device or government laptop. Try to avoid creating copies of records in various places that you will need to manage.
- Purge old files. Go through electronic files and purge the digital ROT (redundant, obsolete, or trivial materials). An important part of records management is getting rid of materials you don't need and that have met their retention requirements.

- Don’t leave public records at home. When you return to work on site, return any hard copy or digital records to your official record-keeping systems.
- Records not normally considered to have long term value may now have historical or research value.

On the other hand Blackburn (2020) saw the solution to managing records during the pandemic as lying on three technological solutions which are:

1. Investing in a cloud-based solution that will allow records managers to wrap their arms around this content. This move will ensure they can roll out a very basic records management program, while also buying some time to implement a more comprehensive program down the line. It may not be the ideal records management strategy, but having visibility of the content is paramount. Records managers should work with the IT department so they can understand what they might need to have in place to get their records managed.

2. For a basic records management program, agencies must focus on what’s important. Retention, disposal or disposition rules don’t matter right now. The most important thing is to be able to get a classification or file plan terms applied to the content, which will give records managers that much needed visibility, along with the space to go back and fix things when there is more time. The goal is not perfection, but “control + breathing space”. Down the track, agencies can push out retention and disposition rules for all this content, but right now, they should just ensure they can manage it.

3. Do it all without bothering the end user. This is the most important recommendation. Agency employees have enough going on right now without records managers asking them to perform additional tasks. Wherever it’s possible (and this should be just about everywhere) records management processes should be implemented without end-user intervention.

Guidelines from archives professional associations during COVID-19

The role played by archives and records in the society cannot be overstated. The Universal Declaration on Archives (UNESCO, 2011) emphasized that, "archives keep decisions, actions and memory" and "they are reliable sources of information that guarantee the security and transparency of administrative actions". On the other hand, the Working Group on Archives and Human Rights of the Latin American Archives Association (ALA) and the Archives and Human Rights Section of the International Council on Archives (ICA) in their recent declaration on “*The*

role of archives in the COVID-19 crisis: a perspective from the protection of human rights" stressed the important role played by archives arguing that:

- Archives are responsible for the preservation and maintenance of records, an essential service during this pandemic.
- The information must be properly managed and solid electronic administration infrastructures must be built to guarantee good management and the rights of citizens.
- Access to quality information is key to combat fake news in times of such uncertainty.
- Transparency facilitates the control of government acts by society, including its responsibility in the protection of individual liberties and the exercise of social rights in the context of the fight against the virus.
- Likewise, working towards greater transparency contributes to enhancing the confidence of citizens in institutions.

The need to create and maintain authentic and reliable records during the COVID-19 pandemic was stressed by the Working Group on Archives and Human Rights of the Latin American Archives Association (ALA) and the Archives and Human Rights Section of the International Council on Archives (ICA) when it stated that "Perhaps at this time, as never before, we recognize Records Management and Archives as public goods and as key elements for the fulfilment of SDG 2030 in relation to access to information".

The need to uphold and strengthen records management practices during COVID-19 pandemic was perhaps best emphasized in a joint statement on COVID-19: The duty to document does not cease in a crisis, it becomes more essential issued by ICA and the International Conference of Information Commissioners, supported by ARMA International, CODATA, Digital Preservation Coalition, Research Data Alliance, UNESCO Memory of the World and World Data System. The joint statement emphasized the need to ensure that whatever decisions were taken by governments relating COVID-19, those actions must be documented for accountability and transparency: The joint statement also emphasised the need to protect and secure all data and records created during the pandemic. The complete statements which I consider to be the most comprehensive response to those who are keen in managing and preserving archives is reproduced below.

(a) Decisions must be documented

Sound records management is more important than ever with governments taking unprecedented steps to deal with the COVID-19 pandemic.

Important decisions are being made by governments involving huge interventions in markets, healthcare and the daily lives of billions of people as they seek to secure the social, economic and cultural wellbeing of their populations and uphold the rule of law.

The pandemic is showing the benefits of access to large and small scale data to inform decision-making, but this does not reduce the need to contextualise records (i.e. paper documents, data, algorithms, code, audio-visual), nor does it exempt governments from documenting their data analysis processes or capturing critical information.

It is essential that the basis of those decisions, the decisions themselves and the senior decision-makers involved are thoroughly documented in order for governments to remain accountable both during and after the emergency and for future generations to be able to learn from our actions.

In these current circumstances, records may be at risk as new ways of working are rapidly adopted without the usual processes and infrastructure. Urgent steps should be taken to address recordkeeping in ephemeral technologies that have to be deployed rapidly.

(b) Records and data should be secured and preserved in all sectors

The duty to document does not only rest with governments, but also with commercial, research and educational institutions.

The impacts of the pandemic will be far reaching, and all organisations need to be cognisant of the importance of proper data and records management. Commercial entities will need essential records to be maintained for the continuity of operations, to evidence rights and entitlements, but also to be able to apply for government subsidies.

Research and educational institutions, especially those involved in tracing the disease, mapping and analysing the pathogen's genome to develop vaccines, must ensure that their records and data are accurate and properly maintained.

The existence of proper documentation practices will enable not only business continuity, research and innovation, but also the evidence of how this crisis was managed for future generations. Archives are the custodians of the 1918 influenza pandemic records, which are being studied by scientists around the world and these institutions will eventually be the stewards for records related to the COVID-19 pandemic.

The economic and societal impact of the current pandemic needs to be evidenced, not only to prevent and/or anticipate similar events but to understand the effect this event will have on current and future generations.

(c) The security, preservation and access to digital content should be facilitated during the shutdown

The ability to study the COVID-19 pandemic, in order to prevent other such events, requires the existence of records management services and archives, otherwise records and data will not be generated and captured in ways that will enable their preservation and access, now or in the future. Records and archives are more than paper documents marked 'official record' – records and record-keepers deal with increasingly complex digital materials such as algorithms and rough or raw data.

As the economic impact of COVID-19 is felt around the world, it will also be critical to secure, capture and preserve the records of defunct companies and/or private entities. This way, the social, cultural and even economic significance of former undertakings can live on.

Just as it is essential to have global agreements on reporting standards, specifications and definitions (as in the Sendai Framework), so it is necessary for archives to be recognised and resourced as the custodians of the raw data that underpins composite data or reported information. The duty to document this information does not cease in a crisis, it becomes more essential than ever

The impact of COVID-19 on the national archives cannot be overstressed. Written evidence submitted by the National Archives UK indicates that:

The impact of COVID-19 is far reaching across the breadth of the archive sector, affecting custodians of archives across businesses, local authorities, universities and charities. Almost every aspect of archives, from daily operations to its existential future has been profoundly affected. At a time of competing pressures on the sector, the most significant effects of COVID-19 on the archive sector are those that represent a risk to archival heritage, which in effect threatens an essential resource for upholding democratic principles dependent on transparency, scrutiny and accountability.

Records management lessons learnt during COVID-19 Pandemic

The outbreak of COVID-19 Pandemic and the impact that the pandemic has had on records and archives has taught us several lessons.

1. That most records and archives management offices were ill-prepared when the pandemic broke out resulting in major disruptions to their operations.

2. That those institutions that stored their records in the cloud fared better with regard to access to their organizational records in comparison to those organization which were still handling paper based records.
3. While it is possible to digitize vast quantities of records, most organizations were ill-prepared for massive digitization of records. For those organizations which had already adopted electronic record keeping systems, they may have found it easier to access their records remotely. But this was only possible for staff who have access to the internet in their homes.
4. The work from home policies that organizations adopted has resulted in inability to account for all the records created outside the office environments. Such gaps may remain unfilled for several years to come.
5. Access to archival materials came to a standstill in archival institutions which had not established their presence in the Internet,
6. It difficult to determine whether there were any breaches relating to access to security classified information access to security classified records.
7. Investing in cloud-based solutions offers great opportunities for assessing records during disasters such as COVID-19.
8. Organizations are duty bound to create and documents their activities experiences for posterity during pandemics such as COVID-19.
9. That since many lives were lost during COVID-19 and there is need to retain records patient records from COVID-19.
10. For legal and pension purposes, there is need to include **employee medical records related to COVID-19 in a retention schedule.**

CONCLUSION

This paper has demonstrated the ways in which organizations both public and private responded to records management challenges brought about by the outbreak of COVID-19. The paper has shown that those organizations that had embraced technology and had migrated their records to the cloud, they were able to continue to access their records from remote locations. However, for these organizations that were yet to embrace technological solutions, their records management services came to a standstill or continued to operate without access to their records. Perhaps the

greatest lesson that has been learnt by records managers and archivists during the COVID-19 Pandemic is that they were ill- prepared for managing records during disasters such as COVID-19 and that it is impossible at this stage to estimate the gaps that have been created in records management offices as a result of the work from home policies. We therefore may never know the volume of records that might have been lost or accessed illegally in homes during this period. We are also yet to know if organization documented fully the impact of COVID-19 on their organization. if not , we will have denied future generations the opportunity to learn from us how humanity responded to major disaster called commonly known as COVID-19.

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PART FOUR

EDUCATION AND TRAINING IN THE 4IR AND COVID ERA

EXPLORING THE SERVICE QUALITY OF MICROSOFT OFFICE TEAMS' IN ELEARNING OFFERED TO GRADUATE STUDENTS IN LIBRARY AND INFORMATION STUDIES AT UNIVERSITY OF BOTSWANA

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Abstract
Information and Knowledge Management (IKM) is one of the critical fields in the management of organisations' daily businesses. Now, more than ever, it is critical for organizations to have effective IKM systems in place for the management of their records. For the past two years, the world saw a robust transformation in which all nations had to respond to the challenge of Covid-19 pandemic. This has not only affected the economies but also the execution of teaching in IKM. The transition to eLearning in IKM principles has become significant since the outbreak of Covid-19 pandemic. Consequently, institutions of higher learning have been forced to innovate, adopt, and implement eLearning methods. These methods have either complemented conventional learning or have fully replaced it. Needless to say, the methods are also useful in curbing the physical contact that may increase the Covid-19 infection rate. This study sought to explore the Microsoft Office Teams' service quality of eLearning, challenges, and experiences by graduate students in library and information studies during the Covid-19 era at the University of Botswana. The sample of this study was 14 participants who participated in focused group interviews and questionnaires which were distributed using MS-Teams and WhatsApp. Questionnaires received a 64% response rate while interviews received 100% response rate. Generally, responses show that students had a good perception about using Microsoft Teams. However, the results have shown that some of the respondents expressed some challenges of using this system - the system is slow when one logs in for the first time; poor internet connections; lack of skills in using MS-Teams, questionability of the integrity of the system. Even though the study generally revealed satisfactory responses, this study recommends that the system should be improved to aid effective and efficient learning, especially through providing feedback to MS-Teams developers and improving internet connections and bandwidths.

Key Terms: *Records and Information Management, COVID-19, eLearning, Microsoft Office Teams.*

INTRODUCTION

The developments in Information and Communication Technology (ICTs) have brought about an unprecedented upsurge in the use of Information Technology for teaching and learning in tertiary institutions. The introduction of technology in teaching has come as an opportune especially during the midst of Covid-19 pandemic. There are various constructs critical in measuring the outcome and quality of education. In past few decades, the key questions raised in teaching were

on whether teaching methods allowed outcome-based teaching principles such as facilitation of learning, learner-centerdness, active and participative learning, creative and critical thinking and problem solving (Reddy, Ankiewicz, Swardt, & Gross, 2003). Hoque (2016), during conference presentation elaborately provided a list of components of teaching approaches including teacher-centered, learner-centred, subject-centred, teacher dominated, interactive, banking approach, constructivist, disciplinal, integrated, individualistic, collaborative, indirect and direct. Nonetheless, the focus in teaching, among others, should also take into consideration the effectiveness, easiness, convenience, and flexibility of teaching.

The quality and effectiveness of the execution of education in the field of Information and Knowledge Management (IKM) is therefore critical. The methods, principles, and strategies used for teaching are the key bases for systematic and orderly logical arrangement of steps in teaching (Hoque, 2016). The teaching principles and methods thus keep on changing to be in par with current technologies and demand by the industry. For the past two years, the world saw a robust transformation in which all nations had to respond to the challenge of Covid-19 pandemic. This has not only affected the economies but also the execution of teaching in IKM. ELearning is one of the important teaching landscapes that have taken a great toll in education. The transition to eLearning in IKM principles has become significant since the outbreak of Covid-19 pandemic. Consequently, institutions of higher learning have been forced to innovate, adopt and implement eLearning methods. These methods have either complemented conventional learning or have fully replaced it. Needless to say, the methods are also useful in curbing the physical contact that may increase the Covid-19 infection rate. Consequently, the teaching and learning aspect have also become a challenge. The teaching principles and methods in line with the current Forth Industrial Revolution become critical. Therefore this paper explores the service quality of Microsoft Office Teams (MS-Teams) in eLearning offered to graduate students in Library and Information Studies (LIS) during the Covid-19 era in the University of Botswana (UB).

LITERATURE REVIEW

The application and importunity of eLearning in academic education has in the past two years gained popularity following the outbreak of Covid-19 pandemic. The process of eLearning is understood to mean a learning that is conducted through ICTs such as electronic media, internet, and other computer-based innovations. ELearning is a "learning system based on formalised teaching but with the help of electronic resources known as E-learning" (The Economic Times, 2021:01). For proper execution of the eLearning process, the teaching institutions must take cognizance of their teaching curricula and be aligned both structurally, technically, and strategically. Maniruzzaman (2016), posit that it is important to align curriculum objectives, instructional strategies, and assessments since these are interrelated and interdependent.

ELearning is discussed in literature with a significant number of benefits and demerits. Kirschner (2012:01) posits that eLearning is a potentially disruptive innovation in education but "there is nothing funny about the need for innovation and the resistance to change". The benefits of eLearning among others are explained by researchers to include the popular online adult learner, stay at home parent and or part time learning, expanded student access to universities that are not in their geographical location, innovative platforms that allow expanded access, students' progress at a quicker rate, budget-friendly, increased globalization, and independent learning (Ghobadian et al., 1994; Santos, 2003; Parker, 2010). Muthuprasad, Aiswarya, Aditya, and Girish (2021) further indicate that the benefits of eLearning include self-directed learning, motivation for learning, learner control, computer and internet self-efficacy, and online communication self-efficacy. The use of eLearning in education may have a strong impact on a large and diverse set of stakeholders and the shift to a global, technology-based knowledge society, competition, and desire for profit, forces a huge application of innovation in education (Flavin, 2012; Kirschner, 2012). This calls for educators and relevant stakeholders to collaborate in the use and application of technology for eLearning. The challenges on education including eLearning are the digital divide due to limited access to technology, lack of skills to use the technology, frequent low/down internet, high competition, and poor-quality services (Ghobadian et al., 1994; Stodnick & Rogers, 2008; Ghislandi et al., 2013,).

Innovation adoption in education

The direction in defining the Forth Industrial Revolution (4IR) is geared towards innovation and technology driven development. Ramas (2016) posits that there is no common definition of the 4IR. However, many scholars approach the concept from different methodological angles including technology driven perspectives that involves physical, digital and biological spheres. The application of 4IR in academic environment is mainly associated with the innovation and technology driven spheres that are used for teaching, learning, and research. The 4IR perspectives are critical in evaluating quality services offered by the use of the technology application. The use of technology in education has led to mixed feelings in to many educators, researchers and all stakeholders. Flavin (2012) opined that one of the concerns is that the students and lecturers use the technologies from non-commercial use, distribution, and reproduction in any medium, and the original work is not owned or controlled by higher education institutions to support and enhance their learning and teaching. One such technological application is the MS-Teams which has now gained popularity for use in eLearning. The next section provides an overview of the application of MS-Teams in teaching and learning.

Affordances of MS-Teams in eLearning

Although Covid-19 has brought unprecedented challenges in the whole world including the education sector, the learning process has still continued. Various institutions of learning have introduced online teaching via different platforms - Microsoft Office Teams being one of them. As a virtual platform, MS-Teams have proved itself beneficial and user friendly to a point whereby it has been absorbed and used widely. The normal that we used to know before the outbreak of the Covid-19 scourge was to physically teach, hold long meetings, and chit-chat in offices. This has since changed and the adoption of virtual platforms had to be embraced. Anecdotal observations indicate that the world realize that MS-Teams has been in existence prior to national and world lockdowns but was not fully known and used like it is to-date.

Microsoft Office Teams is a centralized learning hub where teaching is conducted remotely whether students are on-campus or not. This virtual platform is beneficial to the learner and the educator. The learning process goes on wherever students or educators could be located. Poston, Apostle, & Richardson (2019) have established that MS-Teams simplify collaboration and

management of classes for educators. This platform brings everyone together in one digital classroom where live class sessions texts and voice chats, calendars, quizzes, assignments, live events, and many other activities can occur. With this platform, students are able to also give their feedback through attaching their files. This is an indication that MS-Teams is useful for communication and collaboration between students and their lecturers. Since its vigorous usage, MS-Teams has indicated that it can personalize learning looking on the needs of the students because educators can use it to track students and progress of the whole class and identify learners who are behind in attending classes and attempting assessment and even resolving the learning challenges that the students could be going through (Poston, Apostle, & Richardson, 2019). In a way, learning outcomes can be achieved or even improved through the use of MS-Teams. According to Park & Kim (2020) users of MS-Teams can connect to other applications which have been synced to it. Such applications include Prezi, Kahoot and many more others. The operator can easily grant access to a particular computer application to use and safety of their data is ensured. As such, there are policies that guard against access of data by unauthorized users.

MS-Teams Drawbacks

Even though MS-Teams has proved itself to bring a lot of advantages into the learning system, it has shown that there are challenges that come with it. Researchers have found out that challenges range from poor home internet set ups with low bandwidth and intermittent failures; lack of control on students who can easily be destructed by other applications during the learning process; to lack of discipline in attending classes (Karthikeyan, 2020; Saxena, & Anu, 2020). MS-Teams allow live recordings and reviewing of classes at a later stage and therefore would cater for those who might have been working when classes were on going. Anecdotal observations indicates a drawback in the sense that students sometimes miss live classes with an intention to watch recorded videos at a later stage, but then they fail to follow through what was discussed in their absence.

Services Quality

The use of service quality as an integral tool for improved services delivery in various sectors of industry has gained priority over the years. Services quality is mostly defined or understood in the context of "consistently meeting or exceeding customer's expectations" (Ghobadian, Speller & Jones, 1994:29). The perceived quality is associated with the ability of customers or consumers' judgement of services rendered with the overall excellence (Parasuraman, Zeithaml, & Berry, 1988). As would researchers argue (Saleh and Ryan, 1991; Santos, 2003), service quality is important in identifying success or failure. The application of service quality in academic research has thus also gained popularity. Santos (2003), observe that one of the key factors in differentiating services product and building competitive advantage in academic institutions is the measurement of service quality. Pathmini (2016), emphasizes that the assessment of quality services offered by academic sector is critical just like other service industries in order to satisfy the changing demands in the competitive education landscape. Literature (Leonnard 2018; Kitchroen, 2004) continue to observe that the provision of high service quality is a critical entity in maintaining and increasing student numbers in academic environment. Stodnick and Rogers (2008) observed that students and stakeholders in education demand evidence of effectiveness in achieving educational goal. The service quality is seen to be critical in financial, reputational, and popularity perspectives. Leonnard (2018) posits that the quality of service in academic institutions, especially private universities, indirectly affect the industry, parents, communities and governments. On the other hand, Pathmini (2016), argues that service quality in academic institutions is geared towards the ability to measure the input stage, processing stage and output stage. This implies that studies on impact of service reliability on student satisfaction is critical especially the perspectives or views of students on management.

STATEMENT OF THE PROBLEM

The perception of students on service quality, especially satisfaction, is found to be critical in academic institutions and this is associated with when one's experience of a service offering matches the expectations (Pathmini, 2016). On her study Pathmini (2016:18), observed that the "requirement of a strategic approaches to strengthen the service reliability via promised service accurately and promised service dependably because both of the dimensions were significant to strengthen the student satisfaction". Nonetheless, the significant number of studies continues to

reveal a mirrored number of challenges in eLearning and its services quality. Rodrigues, Chimenti, and Nogueira (2021), posit that educational sector is resistant to innovation. In private education, Rama (2016) observed that the expansion of the private sector consolidated the growth of regulations, and these have culminated in an increase of the scale and quality of some private institutions. This implies that services quality in educational section both in private and public institutions becomes critical. The increased interest in service quality has been observed by Leonnard (2018) to be evident throughout the world and this is confirmed by studies such as Zammuto, Keaveney, & O'Connor, (1996) Abdullah, (2006a, 2006b, 2006c), Manaf, Ahmad, & Ahmed, (2013), Đonlagić & Fazlić, (2015), Chui & bin Ahmad, (2016) and Naidu & Derani, (2016).

Despite the significant efforts on eLearning, literature continues to argue that it is important to explore the adoption of eLearning in different context for a complete and holistic understanding of eLearning. Citing Khodayari and Khodayari (2011), Pathmini (2016:01) emphasizes that "there is a gap between students' perceptions and students' expectations and among factors, reliability is important for university students". This implies that education providers must investigate the quality and characteristics of services offered in academic institutions including the existence of tangibility, reliability, assurance, responsiveness and empathy. Anecdotal observations also indicate that the measurement of the service quality provided by eLearning in Botswana, especially in the field of library and information studies in tertiary education is still limited. This study maintains that the lack of fully understanding the service quality in tertiary education is a stumbling block towards the efficient and effective use of eLearning in teaching environment. This study therefore explored the services quality of MS-Teams in eLearning offered to the graduate students in Library and Information Studies during the Covid-19 era at the University of Botswana.

OBJECTIVES

The specific objectives of the study were to:

- Determine the expectations and perceptions of the graduate students in LIS on the physical and functional facilities/resources (Tangibility) of MS-Teams in eLearning offered at the UB.

- Establish the expectations and ability of MS-Teams to provide the services or resources needed by students dependably and accurately (reliability) on eLearning offered to graduate students in LIS.
- Determine the expectations and perceptions on the ability of MS-Teams to help in prompt/effective students-lecturer correspondences (responsiveness) for eLearning by graduate students in LIS.
- Establish the expectations and perceptions on knowledge, competences and confidence (assurances) of lecturers and students in using MS-Teams services for eLearning offered to graduate students in LIS.
- Determine the expectations and perception of students on the ability of MS-Teams to allow individualised student-lecturer correspondences/chats (empathy) for eLearning by graduate students in LIS.
- Make recommendation for improvement in eLearning teaching environment.

THEORETICAL FRAMEWORK

Theoretical frameworks are important conceptual constructs that direct the execution of research. This study adopted the constructs provided by the Service Quality (SERVQUAL) framework as its guide for the study. The SERVQUAL framework is premised on five key dimensions of; Tangibles (Physical facilities, equipment and appearance of personnel); Reliability (Ability to perform the promised service dependably and accurately); Responsiveness (Willingness to help customers and provide prompt service); Assurance (Knowledge and courtesy of employees and their ability to inspire trust and confidence including competence, courtesy, credibility and security); and Empathy (Caring and individualized attention that the firm provides to its customers including access, communication, understanding the customer) (Musembe, 2016; Van Iwaarden et a l., 2003). The application of SERVQUAL and SERVPERF models is significantly increasing throughout the world (Leonnard, 2018). For this study, the SERVQUAL model was found appropriate in guiding the study to establish the reliability, tangibility, responsiveness, assurance, and empathy in service quality of eLearning using MS-Teams. The SERVQUAL was critical in establishing whether the real performance and quality of services offered by MS-Teams exceeds or satisfy students' expectations on eLearning especially after the outbreak of Covid-19 pandemic. In the context of this study, the attribute of SERVQUAL makes it fit quite

easily to get the students' perceptions in the quality of services provided by the MS-Teams during eLearning process in an academic setup. The application of SERVQUAL has been observed by many scholars to be effective and applicable practically in any organizational or institutional setting including in educational service quality measurement (Van Iwaarden et al., 2003; Musembe, 2016; Naidu & Derani, 2016).

METHODOLOGY

This study was focused on exploring the service quality offered through eLearning using MS-Teams platform for teaching graduate students in LIS during the Covid-19 era at the University of Botswana. For the purpose of this study a pragmatic stance was found appropriate in order to fully explore the reality on service quality on the use of MS-Teams in teaching and learning at graduate level. A concurrent (each method independent of each other) mixed-method approach of collecting both qualitative and quantitative data was important in order to allow external and multiple views to best enable answering of this study's research questions. In line with other studies, mixed method approaches are interdisciplinary in nature allowing different disciplines to address a research phenomenon (Warfield, 2010; Peng et al., 2011; Jokonya, 2016). The study population was the graduate students in LIS who were registered in the year 2021 during the Covid-19 era. Questionnaires were distributed to the 14 participants through email, MS-Teams and WhatsApp. Only 9 responses were received from the participants giving a total response rate of 64%. In line with other studies a 60% and above responses rate is regarded as good response rate (Mugenda & Mugenda, 2013). The study also conducted a focused group interview through MS-Teams for about 60minutes and a total of 13 participants were involved in the interviews. The respondents had the opportunity to respond by talking or writing answers in the chat area. The interview tool was critical to fully understand the research phenomenon and improve on the response rate of the questionnaire. During the group interviews participants were requested to discuss their views on the expectation and perceptions on the tangibility, reliability, responsiveness, empathy, and assurance on MS-Teams. Furthermore participants were requested to air their views on challenges and recommendations for improvement on the use of MS-Teams for eLearning since the outbreak of the Covid-19 pandemic. Data that was collected through the questionnaires was statistically analysed using Microsoft Office Excel. The data collected

through interviews was categorised in themes in line with the research objectives of the study. The presentation and interpretation of both qualitative and quantitative data was complementary (combination of results). This study ensured that confidentiality was maintained to all participants and none of the discussions are directly linked to individual participants and their names are not revealed in the presentation. The methodology chosen for this study is found to be appropriate, valid, and reliable. This is supported by other recent studies (Karthikeyan, 2020; Saxena, & Anu, 2020) which have also used similar methods to address services quality in education.

FINDINGS

The University of Botswana in 2020 launched a new strategy named "Creating a future for the knowledge generation *2020-2029"*. As part of its commitment one of the strategic objectives (Strategic Goal 1) is to "Produce quality well-rounded employable graduates". In view of this, this study sought to establish the service quality on the use of Microsoft Office Teams in eLearning teaching process following the Covd-19 pandemic in 2020. This section provides findings on the study. The presentation of the findings is arranged thematically in line with the objectives of the study.

Demographics on Questionnaire

The respondents in the study were mainly females at 7(78%) and 2(22%) males. The age range of the respondents was mainly 30-39 with 4(44%) respondents followed by the ages of 25-30 and 40 and above of which they were 2(22%) each. The respondents in the study were mainly graduate students in Masters in Archives and Records Management (MARM) at 7(78%) and only 2(22%) students in Masters in Library and Information Studies (MLIS). The following Table 1 provides details on the demographics of the study.

Table 1: Demographics

A) Gender	**Number**	**%**
FEMALE	7	78
MALE	2	22
b) Table 2: Age		
18- 21	0	0

22- 24	1	11
25- 30	2	22
30- 39	4	44
40 and Above	2	22
c) Table 3: Studies pursued		
Masters in Archives and Records Management (MARM)	7	78
Masters in Library and Information Studies (MLIS)	2	22

Mean and Standards Deviation on the findings

Data collection in this study was conducted using a likert scale of 1 to 7 on which 1 was equal to Strongly Disagree and 7 was equivalent to Strongly Agree. The scale was used to get information on both the expectations and perceptions across all the objectives of the study. The average Mean and Standards Deviation on the findings were as follows:

- **Expectations** were calculated to be: **Mean:** 6.748148148 and **Standards Deviation**: 6.276874409
- **Perceptions** were calculated to be: **Mean:** 5.76984127 and **Standards Deviation:** 5.521051583.

Objective1: Expectations and perceptions of the graduate students in LIS on the physical and functional facilities/resources (Tangibility).

The first objective of the study was to establish the expectation and perceptions of the graduate students in LIS on the physical and functional facilities/resources (Tangibility). In services quality explorations, it is critical to get an understanding on the quality of tangibles such as the physical appearances of the services offered by an organization (Saleh & Ryan, 1991). This study explored the expectation and perceptions on the tangibility of MS-Teams in teaching and learning. The expectations on what customers expect for them to grade if services are of good quality or not are critical. In order to explore the views of participants on the physical and functional facilities/resources (Tangibility), participants were requested to rate their expectations on whether an excellent eLearning system should have a modern looking system, visually appealing, and modern interface. Most respondents 6(67%) indicated that indeed they strongly agreed that they expect that an excellent eLearning system should have a modern looking system, visually appealing, and modern interface. Six (67%) strongly agreed, 1(11%) agreed to

statement, 1(11%) partially agreed and 1(11%) was neutral. The respondents were then also requested to rate their perceptions on Microsoft Office Teams if it is an excellent modern looking systems, virtually appealing and good interface. Four (44%) of the respondents partially agreed, 1(11%) agreed, 3(33%) strongly agreed and only 1(11%) strongly disagreed that MS-Teams was an excellent modern looking systems, virtually appealing and good interface. The participants were requested to indicate if they expect that an excellent eLearning system should have good physical facilities/resources/services and should be compatible with various computers, systems, and internet. Seven (78%) strongly agreed, 1(11%) agreed and 1(11%) partially agreed that an excellent eLearning system should have good physical facilities/resources/services and should be compatible with various computers, systems, internet. With regard to MS-Teams 3(33%) strongly agreed, 4(44%) agreed, and 1(11%) partially agreed that MS-Teams used in UB was an excellent eLearning system that has good physical facilities/resources/services and is compatible with various computers, systems, and internet. Also with regard to tangibility participants were requested to provide their expectations on whether an excellent eLearning system should open well in time when clicking into its functions. All (100%) the respondents strongly agreed that an excellent eLearning system should open well in time when clicking into its functions. With regard to MS-Teams only 2(22%) strongly agreed, 3(33%) agreed, 1(11%) partially agreed, 2(22%) neutral, and 1(11%) strongly disagreed MS-Teams was an excellent eLearning system should open well in time when clicking into its functions. A summary of the finding on tangibility is shown in Figure 1 and 2.

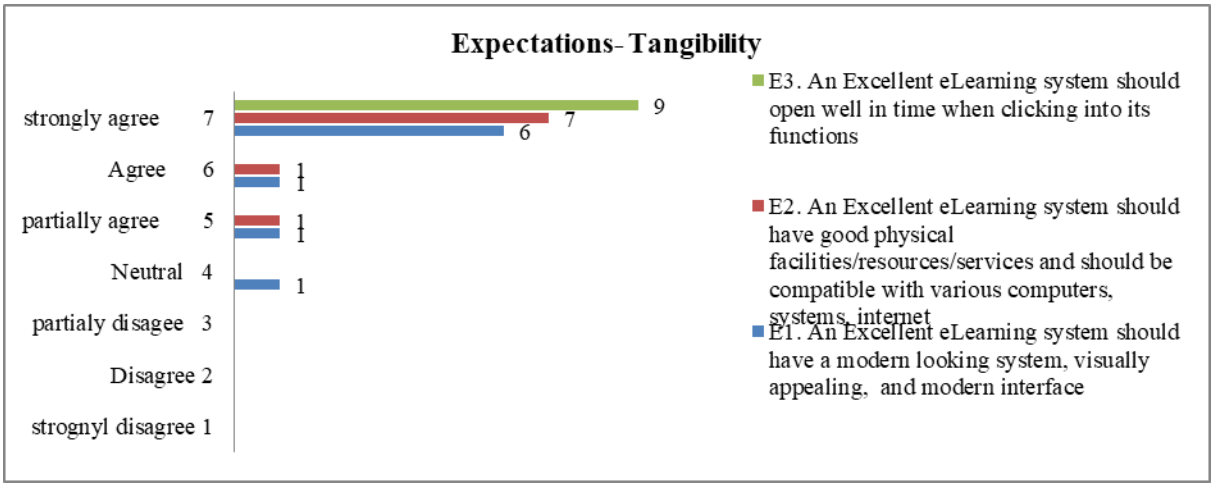


Figure 1: Expectations- Tangibility

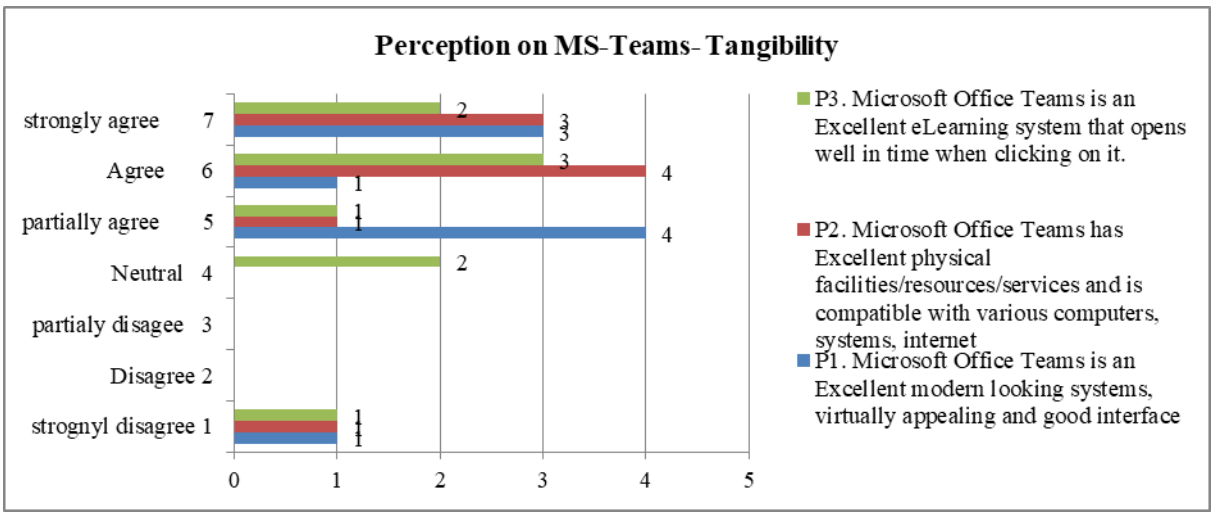


Figure 2: Perceptions on MS-Teams- Tangibility

Through interviews respondents were asked to discuss on what their expectations and perceptions were on the use of (MS-Teams) software for teaching; is the software/platform compatible/usable with various computers, systems, internet etc. and what did they think about the appearance of the MS-Team software (Tangibility). The respondents expressed that MS-Teams was compatible and user friendly with different computer models, it was a good platform for teaching and it allows interactions between lecturer and students, it allows recordings and so forth. One respondent expressed that *"I would say the MS-Teams is compatible with different systems because the software can be used in different computer models".* Respondents were of the view that the MS-Teams meets most of their expectations in terms of information sharing, however internet is a barrier. One participants expressed that *"I think the system is a good platform for teaching, we used it a lot last semester. It allows interaction between the lecturer and the students, and then you can always record lesson to visit later"*. The respondents expressed that it is upon the users to upload information, and OneDrive and other benefits that come along with the MS-teams platforms. Allowing working from one's own locations is one the advantages that come along the benefits of using MS-Teams given the Covid-19 challenges. Expectations are that the MS-Teams should be linked with personals emails beyond the student emails for notifications on classes or any communications. One respondent lamented that *"I would say the system meets most of my expectations, I am satisfied with the system in terms of information sharing, it allows interaction, and it is also done in a digital form from different locations, distance is not a barrier for a majority of us who are training from outside Gaborone.*

It is up to us the users to upload information we need in the App". The appearance of the MS-Teams was observed by respondents to be straightforward and allows the basics that one would expect. One of the respondent indicate that *"I think the appearance is ok, it is straightforward you can easily see what you want".*

Objective 2: Expectations and ability of MS-Teams to provide the services or resources needed by students dependably and accurately (reliability).

The second objective of the study was aimed at getting an understanding on the reliability of MS-Team in teaching and learning at UB DLIS graduate students. To ascertain this, the respondents were requested to indicate their expectations whether an excellent eLearning system should be dependable and accurate in its services. The findings of the study indicate that 8(89%) of the respondents strongly agreed while only 1(11%) agreed that indeed they expect an excellent eLearning system should be dependable and accurate in its services. With regard to their perceptions on MS-Teams, 5(56%) agreed, 3(33%) strongly agreed, and only 1(11%) strongly disagreed that MS-Teams was an excellent eLearning system that is dependable and accurate in it services. On average 89% (strongly agree + agree) of the respondents were satisfied with the quality of services given by MS-Teams on dependability and accuracy of the services.

The respondents were engaged in an interview in the reliability of MS-Teams requesting them to respond to the following question. From your expectations and perceptions do you think MS-Teams have the ability to perform its functions dependably and accurately especially recording of classes and storage of class materials (Reliability)? The respondents discussed that the MS-Teams was reliable since the materials stored in Teams are accessible including previous semester notes. One of the respondents expressed that *"in terms of notification modes, the system could have been linked with our personal emails not only our student emails to probably inform us on our next class or any other upcoming activity that is to be done within the platform. Not all of us are using our student emails….. What is convenient is our personal emails".* The respondents further commented that; *"I think it is reliable because I can still access my last semester materials… it is easy to access and to navigate through".* However, the respondents

were of the view that the system needs prior learning thereafter the system seems to be easy for navigation and reliably.

Objective 3: Expectations and perceptions on the ability of MS-Teams to help in prompt/effective students-lecturer correspondences (responsiveness)

To understand the expectations and perceptions on the ability of MS-Teams to help in the prompt /effective students-lecturer correspondents (responsiveness) respondents were requested to rate whether an excellent eLearning system should perform its functions properly especially recording of classes and storage of class material. Nine (100%) of the respondents were in strong agreement that an excellent eLearning system should perform its functions properly especially recording of classes and storage of class material. However with regard to their perceptions on MS-Teams, 5(56%) strongly agreed, 1(11%) agreed, 2(22%) partially agreed, while only 1(11%) strongly disagreed that MS-Teams was an excellent eLearning system that performs its functions properly especially recording of classes and storage of class materials. The respondents were requested to indicate their expectations on whether an excellent eLearning system should perform the service right at the first time. Five (56%) strongly agreed, 2(22%) agreed, 1 (11%) neutral, and 1(11%) strongly disagreed that an excellent eLearning system should perform the service right at the first time. With regard to perception on MS-Teams respondents 3(33%) strongly agreed or agreed, 1(11%) neutral and only 1(11%) respondent strongly disagreed that MS-Teams was an excellent eLearning system that performs the service right the first time. Still under responsiveness respondents were requested to indicate their expectation on whether an excellent eLearning system should allow the lecturers to effectively help students and provide prompt services during online learning. Eight (89%) of the respondents strongly agreed while 1(11%) of the respondents agreed that they expect an excellent eLearning system to allow the lecturers to effectively help students and provide prompt services during online learning. However, with regard to perceptions on MS-Teams, 6(67%) strongly agreed, 1(11%) agreed, while 2(22%) partially disagreed that MS-Teams was an excellent eLearning system that allows the lecturers to effectively help students and provide prompt services during online learning. A summary of the findings on responsiveness is shown in Figure 3 and 4.

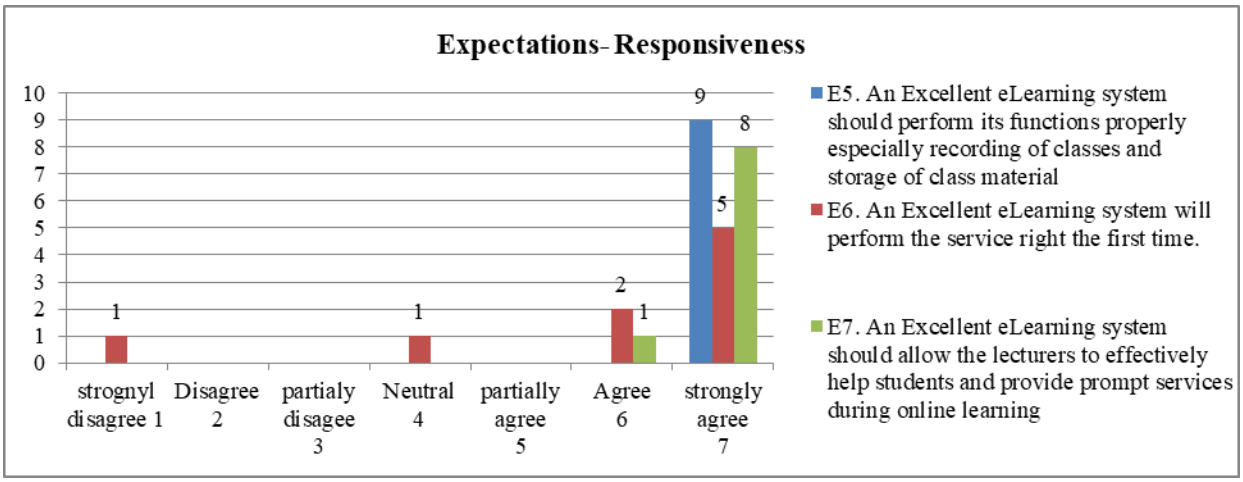


Figure 3: Expectation- Responsiveness

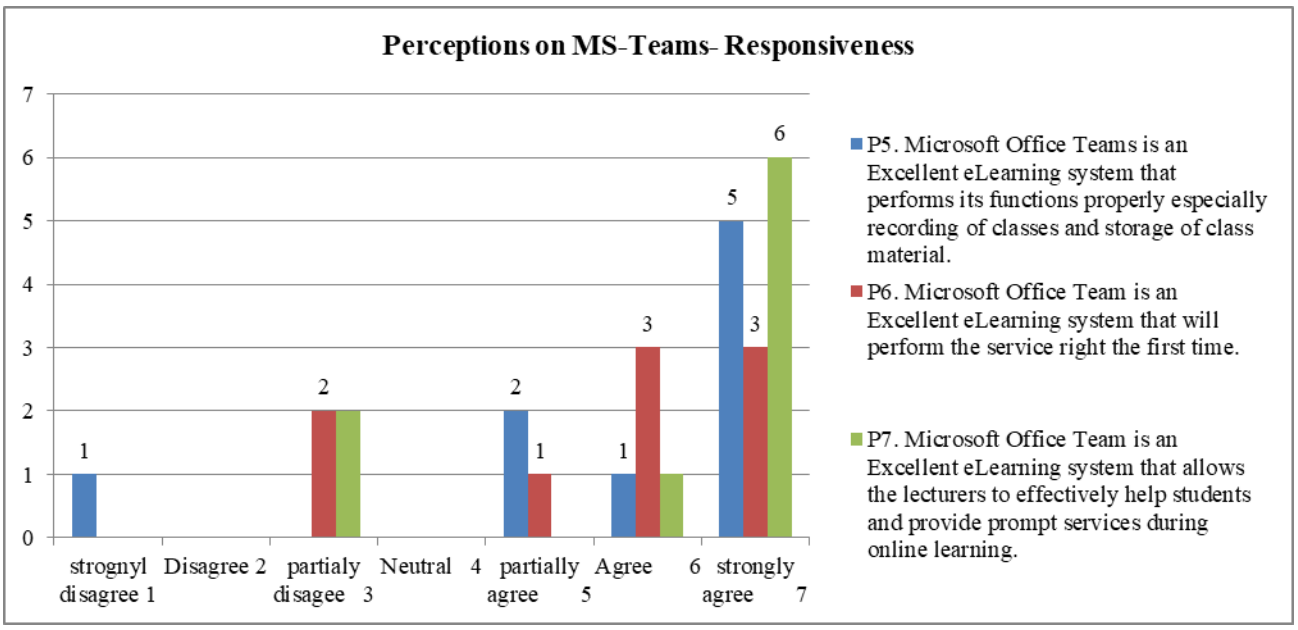


Figure 4: Perceptions on MS-Teams -Responsiveness

An exploration on responsiveness was also conducted using interviews in which the respondents were requested to answer the question; do you think MS-Teams allow prompt/effective students-lecturer correspondences for eLearning by graduate students in library and information studies (Responsiveness)? The respondents revealed that the system is slow when logging in for the first time but it would then stabilizes immediately after logging in. An extract from one of respondent expressed that "*from my experience I think when you are logging in for the first time it is slow,*

but when you are already logged in it is fine". On average other navigations are responsive in a prompt way.

Objective 4: Knowledge, competences and confidence (assurances) of lecturers and students in using MS-Teams services for eLearning offered to graduate students in LIS

In order to establish the quality of services, objective 4 focused on establishing the knowledge, competences and confidence (assurances) of lecturers and students in using MS-Teams services for eLearning offered to graduate students in LIS. Respondents were requested to rate their expectation on whether an excellent eLearning system should allow ease of use by both lecturers and the students. Nine (100%) of respondents strongly agreed that indeed an excellent eLearning system should allow ease of use by both lecturers and the students. However with regard to MS-Teams, 5(56%) strongly agreed, and 1(11%) partially disagreed while the rest (1 each) were neutral or partially agreed. The respondents were also requested to rate their expectations on whether an excellent eLearning system should allow lecturers to effectively help students and provide prompt services during online learning and 9(100%) strongly agreed with the statement. On their perception on MS-Teams, 6(67%) strongly agreed, 1(11%) agreed and 2(22%) partially disagreed that MS-Teams was an excellent eLearning system that allows lecturers to effectively help students and provide prompt services during online learning. Furthermore the respondents were requested to rate their expectations on whether an excellent eLearning system should allow lectures to have confidence, competence and credibility in teaching. Seven (78%) strongly agreed, 1(11%) partially agreed, and 1(11%) was neutral. When asked to rate their perceptions on whether MS-Teams was an excellent eLearning system that allow lectures to have confidence, competence and credibility in teaching, 5(56%) strongly agreed, 2(22%) agreed while 2(22%) were neutral. The summary of these findings is shown in Figures 5 and 6.

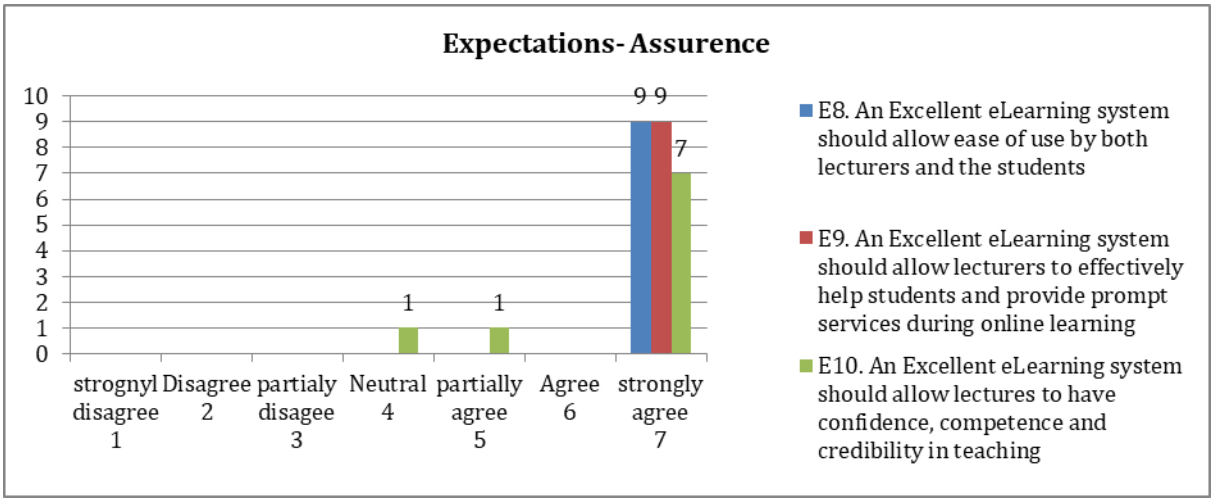


Figure 5: Expectations- Assurance

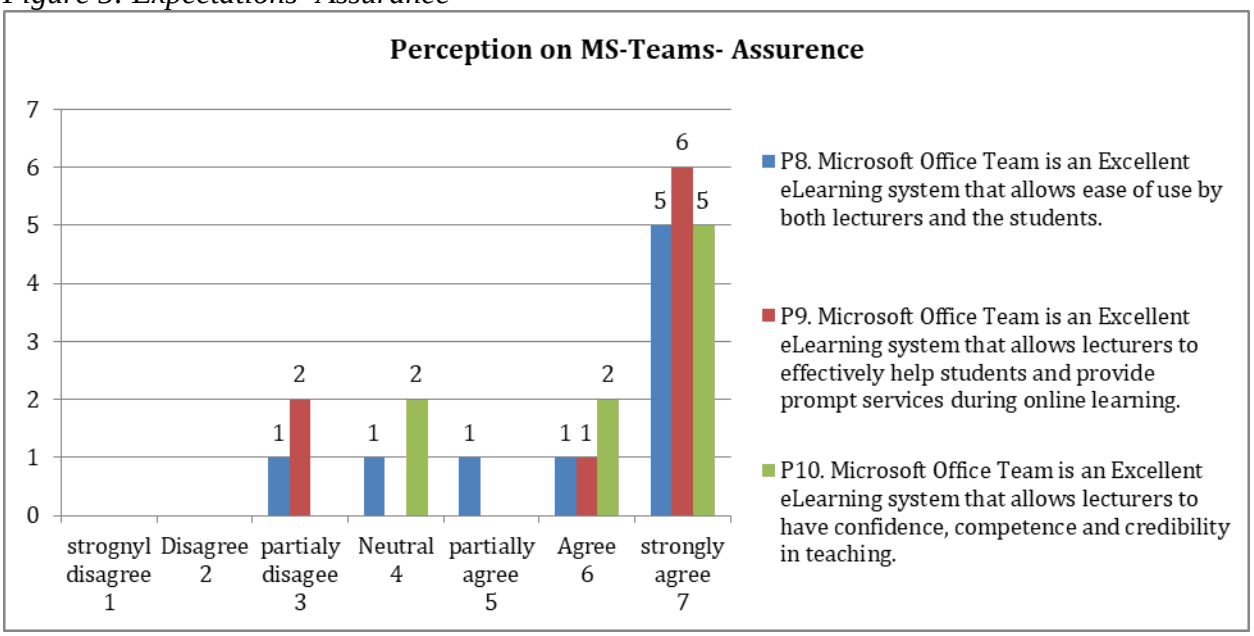


Figure 6: Perceptions on ME-Teams- Assurance.

Interviews were also conducted with respondents to indicate their views on assurance as a form of services quality in teaching and learning. The respondents were asked as follows: From your expectations and perceptions do you think the lecturers and students have enough or basic knowledge and skills to teach and learn using MS-Teams? Do you think the lectures and students have confidence, competence and credibility in teaching and learning using MS-Teams? From your experiences what do you think about the security, authenticity, and integrity of student-lecturer data captured in MS-Teams during teaching online (Assurance)? Respondents indicated that '*basic knowledge on MS-Teams was important. For instance during the first presentation I*

had challenges in attaching presentations especially PDF. Most of the lecturers on the other hand seemed to be having the basic skills'. The respondents were of the view that they don't have confidence in using Teams. This is basically due to lack of skills in using the system. One respondent expressed that *"when we started using teams last semester there was a time where we made presentations, at the time some of us we couldn't upload our presentations and show screen from our side, we were assisted by the lecturers because we sent them prior presentation."* With regard to confidence the respondents expressed that "*most of staff have the skills and confidence, I believe for me the students don't have confidence.... last semester we did not have the skills and we still have challenges, we have to learn as we go along".* The security in the Teams seems to be reliable and moderately secure in most cases. There has been no licking in information so far as per their experience, however, the information stored in MS-Teams often loses integrity because the information shared can be edited especially if it is Microsoft Office Words. It is therefore important to always have access permission be controlled. Expressing on this one respondent indicated that "*I have come to realise that the security is moderate, because I have realised that some of the documents posted by our colleagues or lectures, people can go in there and modify them, if people don't pay attention they might not realise changes that have been made or just overlook them, so you can't say that the information in Teams will remain the same way it was uploaded, unless the lectures limit permissions to the documents".* So sometimes the documents loose integrity, because people have access to modify documents.

Objective 5: The expectations and perception of students on the ability of MS-Teams to allow individualised student-lecturer correspondences/chats (empathy) for eLearning by graduate students in LIS.

The objective 5 sought to get an understanding on expectations and perception of students on the ability of MS-Teams to allow individualised student-lecturer correspondences/chats (empathy) for eLearning by graduate students in LIS. Respondents were firstly requested to indicate their expectations on whether an excellent eLearning system should be safe in transactions, and if an excellent eLearning system should provide good security, authenticity, and integrity of student-lecturer data captured during teaching online. Eight (89%) respondent strongly agreed, that an

excellent eLearning system should be safe in transactions, and100% of the respondents also strongly agreed that an excellent eLearning system should provide good security, authenticity, and integrity of student-lecturer data captured during teaching online. An investigation on perceptions on whether MS-Team was an excellent eLearning system that is safe in transactions and if MS-Teams provided good security, authenticity, and integrity of student-lecturer data captured during teaching online was conducted. As shown in Table 4 and 5, four (44%) respondents strongly agreed, whilst 2(22%) each agreed and partially agreed, and only 1(11%) strongly disagreed that MS-Teams was an excellent eLearning system that is safe in transactions. Four (44%) strongly agreed, 2(22%) agreed and 1(11%) in each either, partially agreed, neutral or partially disagreed that MS-Teams provided good security, authenticity, and integrity of student-lecturer data captured during teaching online.

Expectations	**strongly disagree 1**	**Disagree 2**	**partially disagree 3**	**Neutral 4**	**partially agree 5**	**Agree 6**	**strongly agree 7**
E11. An Excellent eLearning system should be safe in transactions						1	8
E12. An Excellent eLearning system should provide good security, authenticity, and integrity of student-lecturer data captured during teaching online							9
E13. An Excellent eLearning system should allow lecturers to provide answers to students' questions			1			1	7
E14. An Excellent eLearning system should be accessible and allows easy communication during online teaching							9
E15. An Excellent eLearning system should allow 24hour service in a convenient way to all students						1	8

Table 4: Expectations- Empathy

MS-Teams Perceptions	**strongly disagree 1**	**Disagree 2**	**partially disagree 3**	**Neutral 4**	**partially agree 5**	**Agree 6**	**strongly agree 7**
P11. Microsoft Office Teams is an Excellent eLearning system which is safe in transactions.	1				2	2	4
P12. Microsoft Office Teams is an Excellent eLearning system that provides good security, authenticity, and integrity of student-lecturer data captured in MS-Teams during teaching online.			1	1	1	2	4
P13. Microsoft Office Teams is an Excellent eLearning system that allows lecturers to provide answers to students' questions.			1	1		1	6
P14. Microsoft Office Teams is an Excellent eLearning system that is accessible and allows easy communication and individualised student-lecturer			2			1	6

correspondences/chats during online teaching.							
P15. Microsoft Office Team is an Excellent eLearning system that allows 24hour services utilization in a convenient way to all students.			1	1		1	6

Table 5: Perceptions on MS-Teams- Empathy.

The respondents were also asked to indicate their expectations on whether an excellent eLearning system should allow lecturers to provide answers to students' questions. Seven (78%) of the respondents strongly agreed, whilst 1(11%) in each agreed or partially agreed. With regard to their perceptions on MS-Teams, 6(67%) strongly agreed whist 1(11%) in each either agreed, neutral, or partially disagreed that MS-Teams was an excellent eLearning system that allow lecturers to provide answers to students' questions. The respondents were asked to rate their expectations on whether an excellent eLearning system should be accessible and allows easy communication during online teaching and 100% of the respondents strongly agreed. However, when it comes to perceptions on MS-Teams 6(67%) strongly agreed, 1(11%) agreed, whilst 2(22%) partially disagreed that MS-Teams was an excellent eLearning system that is accessible and allows easy communication during online teaching. Furthermore, the respondents were requested to rate their expectation on whether an excellent eLearning system should allow 24hour service in a convenient way to all students. Eight (89%) strongly agreed whilst 1(11%) respondent agreed that they expect an excellent eLearning system to allow 24hour service in a convenient way to all students. With regard to MS-Teams only 6(67%) rated the statement at strongly agree, whilst 1(11%) in each rated the statement as agree, neutral and partially disagreeing that MS-Teams was an excellent eLearning system that allowed 24hour service in a convenient way to all students. A summary of these finding is shown in Table 4 and 5.

The study also conducted interviews with the respondents on the question; from your expectations and experiences/perceptions do you think MS-Team is accessible and allows easy communication and individualised student-lecturer correspondences/chats (Empathy)? The respondents discussed that the MS-Teams allows easy communications and chatting to lectures. The challenges observed is mainly due to connections, where by the lecturer could not be audible. One of the respondents commented that; *"one of the challenges is the issue of connectivity and the quality of the network that the lecturers connect with, sometimes they*

become inaudible or their voices are not clear on our side, possibly because of the bandwidth or the network at their area". However, respondents were of the view that the system allows lecturers to provide answers to students' questions. However, there can be mixed-up on joining classes where by students can find themselves being lost in MS-Team classes especially if there are two or more links running at the same time. Expressing on this one respondent commented that "*today I ended up being lost in class, which create a delay for a class because the lecturer will have to try and get everyone to the correct class…*"

Objective 6: Observed challenges and recommendation for improvement

The application of MS-Teams is gaining popularity in all business sectors. This equally importantly includes education. However, MS-Teams have various challenges that range from technology, administrations, implementation and financial complications. To ascertain this, the study requested participants to indicate the key challenges that they experienced when using MS-Teams during the teaching in Covid-19 era at the UB. A significant number of respondents were of the view that MS-Teams required a good internet connection which is not always a guarantee everywhere in Botswana. Other than poor connectivity, especially when away from school, the MS-Team was a very good platform for teaching and has been very effective during the Covid-19 era. Despite the fact that the UB had made attempts to address low network coverage by giving all students sim-cards with data bundles, there were still problems of low bandwidth. As one of the challenges, some respondents were of the view that sometimes the desktop applications could not join classes immediately and provided pop-up messages saying that it "encountered a problem". Such challenges were also linked to the Network problems. Respondents further indicated that sometimes it was not easy for students to use MS-Teams, especially if they could not find the link to the classes when there is no group created.

Literature observes that lack of knowledge is one of the key challenges on technology usage. As one of key measurable in the SERVQUAL framework, tangibles (physical facilities, equipment and appearance of personnel) are important for investigations on service quality (Musembe, 2016; Van Iwaarden et al., 2003). In line with the construct on tangibility, respondents elaborated that they had skills gap on using MS-Teams. The respondents expressed that some students did

not have any knowledge to use Teams and that made group presentations a mess. For example, one respondent lamented that *"I lacked the basic skills to use Microsoft Office Teams; thus, I found it challenging to join class, mute or unmute audio and video, wave or un-wave, share presentation slides and offload them, invite others to class, among other functions".* The respondent further lamented that often files were not arranged in date order to help identify the latest additions. Emphasizing on the file arranged challenges one respondent expressed the concern by saying; *"later in the semester, I could not access files on Teams despite several verification attempts. Conversely, the IT Team was not responsive through email, and they were impossible to reach physically (office often closed)".*

In line to the construct of empathy in exploring service quality, the respondents were of the view that *"the MS-Teams lectures were mainly audios making it uninteresting and less interactive; it was like listening to an audiobook".* Bringing in the aspect of interoperability, one of the respondents indicated that the MS-Team was unfriendly when joining using mobile phones (there were limited features). However, beside the issue raised respondents were of the view that in overall MS-Team was convenient and it was comfortable attending classes from their desired locations. And the MS-Teams recordings were of additional advantage in terms of revision. In addition environmental issues such as noise outside the university are key challenges. This happens especially when one is in class and the neighboring colleagues are having a party or so.

Recommendations for improvement

The respondents were requested to provide any key recommendations for improvement on services quality of using Microsoft Office Team in eLearning. Respondents indicated that some of them they learned using MS-Teams when they stated their graduate studies, with the speed that they were able to cope with it one could say MS-Teams is a good platform. Expressing on this one respondent said; *"I first learned of MS-Teams last year (2021) when starting my Masters so far it is an excellent service. One just needs to take their time and learn how to navigate through it."* As such, most of the problems encountered were due to lack of knowledge on using MS-Teams. It was therefore paramount for students to be given introductory lessons on operating the platform through effective training/tutorial for students on the usage before classes

begin. To avoid delays during classes, respondents advised that it was critical for students to always join classes few minutes before time.

Respondents also stressed that it was important to establish channels of providing feedback to the MS-Teams developers through the feedback applications such as rating calls. In addition the MS-Teams developers should improve the features to make it more ideal for the purpose of research, teaching and learning. In part of the universities, lecturers should be provided with good computers and better internet services to minimize disruptions during lectures. To improve class management the respondents indicated that creation of groups for students and encourage use of the MS-Team calendar was crucial. In addition, lecturers should do demos of some of the practical activities to show students how certain procedures are conducted since Covid-19 restrictions prevent physical meetings. This demonstration would help the students to visualize the practicality of classes. Students should attend class in video format to help improve attendance and participation/interactions.

With regard to technical issues, respondents lamented that the IT staff should be more responsive and time-conscious. There should be more robust approaches to the problems on connections, and provision of computer devices that can support MS-Teams to each student. However, respondents recommended that despite the good benefits of MS-Teams if class sizes were not large physical classes should always be prioritized. Technology in general, having interest in application of technology becomes important for improving self-skills. Invitation for joining tutorials for UB was offered, however, the limitation was the convenience of the time of the tutorial. The tutorials are often done during the day whilst some of the students are at work. There is need to find a better time for all.

DISCUSSIONS

The advent of technology use is critical in these days especially during the Covid-19 pandemic. This is where we see transformation in teaching and learning methods. Flavin (2012) expresses this transformation as disruptive technologies in higher education. Rojabi (2020:163) observed that “the online learning via Microsoft Teams is categorized as something new for the students

but this interaction and learning environment motivated students in participating online learning, as a result, they can easier to comprehend the learning materials". In line with these current teaching and learning process, one of the objectives of this study was to determine the expectations and perceptions of the graduate students in LIS on the physical and functional facilities/resources (Tangibility) of MS-Teams in eLearning offered at the UB. The overall findings of this study suggest that MS-Teams seem to be satisfactory (77%) when it comes to physical and functional facilities/resources. On average (strongly agree + agree = satisfaction), most participants (78%) of the respondents indicated that indeed they expect that an excellent eLearning system should have a modern looking system, visually appealing, and modern interface. Similar studies also posit that indeed a satisfactory systems should have the ability to integrate various systems that have interconnected components such as: E-learning system; University Management Information System; E-library system; E-content development and other services to students (Munkhtsetseg & Uyanga, 2013). This is important given the continuous technological transformations that take place in innovation and technology. A study by Sobaih et all, (2021:01) expressed similar findings to this study in which their study observed that the usage of both social network sites and MS-Teams helped students "to access information and learning resources, have good impact on their knowledge construction and critical refection, and report overall positive learning experience". The findings of this study are also quiet similar to a study on 'assessing the effectiveness of Microsoft Teams during Covid-19 for online learning: a students' perspective' (Karthikeyan, 2020), in which the participants when comparing MS-Teams with other platforms such as Zoom, Google Meet, and Cisco WebEx, they also felt that MS-Teams was rated good at 68.2%.

The second objectives of the study were premised on establishing the expectations and ability of MS-Teams to provide the services or resources needed by students dependably and accurately (reliability) on eLearning offered to graduate students in LIS. The findings of this study reveal that indeed the respondents (99%) expect an ELearning system to be dependably and accurate (reliability). Ascertaining this on MS-Teams, the respondents rated MS-Teams to be at 89% (strongly agree + agree = satisfaction) by indicating that they were satisfied with dependability and accuracy (reliability) of MS-Teams. Similarly observations were also revealed in a study by

Sobaih, Salem, Hasanein and Elnasr (2021) in which the participants of the study were of the view that the class interactions online supported their learning experience. This study also sought to determine the expectations and perceptions on the ability of MS-Teams to help in prompt/effective students-lecturer correspondences (responsiveness) for eLearning by graduate students in LIS. Effective student-lecture is critical in higher education learning and in the case of India, the New Education Policy proposed by the Government expect students who are designers of their future country through proper educating, encourage and enlightening programmes (Saxena & Anu, 2020). This study observed that 100% of the respondents were in strong agreement that an excellent eLearning system should perform its functions properly especially recording of classes and storage of class material. To relate this to MS-Teams, on average 67% of the respondents were of the view that MS-Teams was performing its functions properly especially recording of classes and storage of class material. Seventy eight percent (78%) of the respondents went on to indicate that the MS-Team was performing the service right at the first time, and it allows the lecturers to effectively help students and provide prompt services during online learning. However, the respondents revealed that the system is slow when logging in for the first time. The findings in this study are coherent to other studies which also reveal that MS-Teams is good in services quality including responsiveness (Karthikeyan, 2020).

One such critical aspect in services quality is the assurances that are given in customer services. As researchers observes, (Musembe, 2016; Van Iwaarden et al., 2003), assurances deals with the ability to provide knowledge and courtesy of employees and their ability to inspire trust and confidence including competence, courtesy, credibility and security. In line with these notions of SERVQUAL as a theoretical guide to this study the fourth objective of the study sought to establish the knowledge, competences and confidence (assurances) of lecturers and students in using MS-Teams services for eLearning offered to graduate students in LIS. The findings reveal that 100% of respondents strongly agreed that indeed an excellent eLearning system should allow ease of use by both lecturers and the students. Seventy eight percent (78%) of the respondents indicated that they were satisfied with MS-Teams since it allows lecturers to effectively help students and provide prompt services during online learning. In line with assurances the respondents indicated that basic knowledge on MS-Teams was important. As

shown in the findings section, one respondent expressed that '*for instance during the first presentation the students had challenges in attaching presentations especially PDF. Most of the lecturers on the other hand seemed to be having the basic skills.*' The respondents felt that the challenges they had on assurances was due to lack of confidence in using MS-Teams. Similar sympathy is also observed in literature by Karthikeyan (2020) whose study observed that 50% of the respondents agreed and 18.2% strongly agreed that giving attendance during class was simple and easy. Both the qualitative and quantitative findings in this study goes on to observe that the respondents were somewhat satisfied that MS-Teams allow lectures to have confidence, competence and credibility in teaching. These findings shows the satisfactions on the transformation to online learning. A study by Basilaia and Kvavadze (2020:07) also report that; "based on the first-week statistics of the online teaching process at one of the private schools in Georgia, we can conclude that transition from the traditional to the online education systems at the school was successful".

One such critical objective was to determine the expectations and perception of students on the ability of MS-Teams to allow individualised student-lecturer correspondences/chats (empathy) for eLearning by graduate students in LIS. The aspect of empathy is expressed in literature to be critical in understanding services quality on caring and individualized attention that the firm provides to its customers including access, communication, and understanding the customers (Parasuraman, Zeithaml, & Berry, 1988; Van Iwaarden et al., 2003; Musembe, 2016; Naidu & Derani, 2016). The respondents for this study were therefore requested to rate their expectations on whether an ELearning system should provide good security, authenticity, and integrity of student-lecturer data captured during teaching online. Hundred percent (100%) of the respondents indicated that indeed an eLearning system should provide good security, authenticity, and integrity of student-lecturer data captured during teaching online. However, when it comes to Teams, on overage 66% of the respondents were satisfied with MS-Teams on safe transactions, good security, authenticity, and integrity of student-lecturer data captured during teaching online. Seventy eight percent (78%) of the respondents were further satisfied that MS-Teams allowed accessible and easy communication during online teaching. Respondents were of the view that the system allows lecturers to provide answers to students' questions. The

findings in this study are in line with other studies which expresses the importance of evaluating perceptions and expectations in relation to responsiveness and reliability services offered in universities (Khodayari & Khodayari, 2011; Pathmini, 2016).

As researchers observe, MS-Teams is critical in learning process especially given that students learn wherever they are located, and the MS-Teams simplify collaboration and management of classes for educators (Poston, Apostle, & Richardson, 2019). However there are various challenges also observed in MS-Teams. This study observed various challenges such as poor networks, bandwidth, integrity, audibility, and security issues. The respondents as indicated under the findings expressed that there are sometimes mixed-ups on joining classes where by students can find themselves being lost in MS-Team classes especially if there are two or more links running at the same time. Literature (Poston, Apostle, & Richardson, 2019) posit that the MS-Teams platform brings everyone together in one digital classroom where text, voice chats, calendars, quizzes, assignments, live events, and many other activities can occur. Somehow contrary, the respondents in this study indicated that the interface system was poor making online learning difficult. For example, class discussions were always difficult to do as students' participation was low hence sometimes classes would go silent for a longer period of time without student engagement. The observed challenges in this study are similar to a study by Karthikeyan (2020), who lamented that low bandwidth and intermittent failures, lack of control on students who can easily be destructed by other applications during the learning process and to lack of discipline in attending classes were challenges observed in relation to MS-Teams.

CONCLUSION

The presentation of this study was on 'Exploring the service quality of Microsoft Office Teams' in eLearning offered to graduate students in library and information studies at University of Botswana.' To achieve this, the study sought to explore on expectations and perceptions on the use of (MS-Teams) software for teaching especially software/platform compatible/usable with various computers, systems, internet and the appearance of the MS-Team software (Tangibility); ability to perform its functions dependably and accurately especially recording of classes and storage of class materials (Reliability); prompt/effective students-lecturer correspondences (responsiveness); lectures and students confidence, competence, security, authenticity, and

integrity and credibility in teaching and learning using MS-Teams(Assurance) and accessibility and ease of communication and individualised student-lecturer correspondences/chats (Empathy). The findings of the study generally revealed satisfactory (strongly agree + agree = satisfaction) responses. The average standard deviation of the study on expectations was 6.3 indicating that the respondents agreed with most of the expectations on a systems. The average standard deviation for the perceptions on MS-Teams was 5.5 indicating that most of the respondents partially agreed or agreed that they were satisfied with MS-Teams. The findings in this study also observed a significant number of challenges ranging from poor internet connections, lack of skills in using MS-Teams, questionability of integrity of the system and features that seems not be enticing on the outlook of Teams. Going forward the study recommends that it is therefore paramount for students to be given introductory lessons on operating the platform through effective training/tutorial for students on the usage before classes begin. To avoid delays during classes, it is critical for students to always join classes few minutes before time. Given the findings in this study, it is further recommended that it is important to establish channels of providing feedback to the MS-Teams developers through the feedback applications such as rating calls. In addition the MS-Teams developers should improve the features to make it more ideal for the purpose of research, teaching and learning. In part of the universities, lecturers should be provided with good computers and better internet services to minimize disruptions during lectures.

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THE CONDUCT OF ACADEMIC SERVICES AND HICCUPS IN HIGHER EDUCATION INSTITUTIONS (HEIS) IN THE 4IR BOTSWANA

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Abstract
The thrust of academic services in higher education institutions (HEIs) centres on teaching, learning and research. Resting on the three legged stand and positioned for human development, higher education institutions are vital stakeholders that join the governments of their various nations to drive their programmes and agenda to successful end. Conversely, the progenitors of the fourth industrial revolution (4IR) affirm it represents a fundamental change in the way we live, work and relate to one another, adding that it is a new chapter in human development, enabled by extraordinary technology advances.

Prior to the advent of the 4IR, the Government of Botswana had begun the implementation of the country's National ICT policy, otherwise known as Maitlamo, was on the verge of completing a developed national strategy called Vision 2016 and commencing the implementation of Vision 2036. At the HEIs level, especially, the premier University of Botswana, with a competitive advantage over other HEIs in Botswana, had begun elearning/ICT initiatives, and strategic plan to 2016 and beyond, among others. Other institutions of higher learning are obviously also following the pace of the University of Botswana. Aided by the library and information service, teaching, learning and research in these institutions witness a new fillip and experience not only in academic development, but also human development. Even then it does not seem there is smoothness in the performance of teaching, learning and research service in the institutions of study. No thanks to the challenges confronting them!

The study, among others, assesses the current academic practices in terms of teaching, learning and research vis-à-vis the application of technologies and hiccups faced in two selected higher education institutions (HEIs) in the 4IR Botswana. The paper focusses on two public HEIs in Botswana, namely, University of Botswana (UB), and Botswana Open University (BOU), the former operating largely through conventional face-to-face delivery system and the latter, distance delivery mode. The study adopts interpretivist approach as its paradigm and purposively targeted four senior academic and library staff members in each of the two institutions for interview. The findings revealed that though with some difficulties, the academics were getting used to elearning/teaching system. Covid pandemic and cash crunch remain the two main challenges confronting the two institutions in rendering effective service. The findings also revealed that libraries rely more on e-resources advertised on their e-platforms to assist as users are increasingly getting reduced in the libraries. Some relevant recommendations are offered.

Keywords: *e-learning/teaching, higher education institutions (HEIs), Covid, financial constraint, e-resources, library and information service, Botswana*

BACKGROUND INFORMATION

Higher education institutions (HEIs) play vital roles in the development of any nation all over the world. UKEssays (2018) describes HEIs as expedient agents of development in the nation building. The thrust of academic services in higher education institutions (HEIs) centres on teaching, learning and research. Resting on the three legged stand and positioned for human development, HEIs through their service are vital stakeholders that join to drive the programmes and agenda of their various governments. Besides, as agents of development in nation building, HEIs fulfil the role of providing the workforce as well as producing government and private sector leaders. In his discourse on the contribution of higher education to society's development, Mabelebele (2013) observed that all successful nations in the world have one common ingredient as their success mix: a well-functioning Higher Education system, able to perform a range of functions in society. In elucidating on the role of universities as vital arm of HEIs, UKEssays (2018) states that universities generate, disseminate and utilise knowledge. They make immense contribution to socio-economic and political developments of their nations.

Fredua-Kwarteng (2021) sees the HEIs mission as focusing on two broad areas of development, namely, developmental research and developing and turning out relevant and impactful graduates. On the latter, he affirmed the impactful graduates should be equipped with the skills, knowledge and disposition needed to meet the requirements of wherever the university is located. Whilst on developmental research, Fredua-Kwarteng notes that it involves providing invaluable contextualised knowledge, insights and locally relevant recommendations for policy formulation and implementation; solving existential problems; creating technological products; and producing new knowledge that can be adapted for economic, political and social improvement. In his belief, Sharma (2015) states the most important role that HEIs have been assigned is the production of highly skilled manpower and research output to meet perceived targets. He adds that another role that universities may play is in the building of new institutions of civil society, in developing new cultural values, and in training and socializing people of new social era. UKEssays appears to lend credence to the assertion when it asserts that as primary contributors to economic growth, HEIs produce scientists, engineers, professionals, technicians, scholars, managers and men of exquisite capabilities.

As the HEIs are making waves in human development, the fourth industrial revolution (4IR) made its debut, with the protagonists declaring it as a new chapter in human development, enabled by extraordinary technological advances. The advocates of the revolution claim that it represents a fundamental change in the way we live, work, and relate to one another. Contreras (2021) describes the era of the Fourth Industrial Revolution, where the internet of things (IoT) will become more pervasive, be seen in the adoption of automation, artificial intelligence, robotics, digitalization and virtual interactions as everyday technologies not only in the arena of work but even in interpersonal interactions. The World Economic Forum (2022) states that The Fourth Industrial Revolution is not just about technology-driven change; but it is an opportunity to help everyone, including leaders, policy-makers and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centred future. The Forum contends that the real opportunity is to look beyond technology and find ways to give the greatest number of people the ability to positively impact their families, organisations and communities.

It is remarkable to note that prior to the advent of the 4IR, the Government of Botswana had begun the implementation of the country's National ICT policy, otherwise known as Maitlamo, and was on the verge of completing a developed national strategy called Vision 2016 and commencing the implementation of Vision 2036. Besides, Botswana has been involved in the United Nations 2030 Agenda for Sustainable Development and its goals (SDGs) which is based on the central and transformative promise that 'no one will be left behind'. In his Botswana Country Report on ICT in Education in Botswana, Isaacs (2007) affirmed that the National ICT policy provides a roadmap to drive social, economic, cultural, and political transformation through the effective use of ICTs. It aims at providing a communications network that meets high international standards and ensure the country has the skills to be an ICT leader. He iterated that the key goals of Maitlamo are for Botswana to become a sub-Saharan ICT hub, to create an enabling environment for the growth of an ICT industry in the country, and to provide universal service and access to information and communication facilities in the country. Similar to the quest for the National ICT policy was the earlier established national development vision, Vision

2016 that came into existence in 1996 following nationwide consultations led by a Presidential Task Group. The maiden Vision sought to achieve prosperity for all through seven pillars, which elaborated on the national aspirations. The identified seven (7) pillars comprised: 1) an educated and informed nation, 2) a prosperous, productive and innovative nation; 3) a compassionate, just and caring nation, 4) a safe and secure nation, 5) an open, democratic and accountable nation, 6) a moral and tolerant nation, and 7) a united and proud nation.

The results from the overall indicators on the National ICT policy and Vision 2016 reveal that the country has done fairly well in a number of areas, particularly in improving access to education and maintaining social cohesion in the latter. While efforts on the maiden Vision were commendable, some lessons were learnt. For instance, in the review of the first Vision, Botswana Vision 2036 (2019) acknowledges that a key lesson from Vision 2016 is that there is a need for strong delivery system that will ensure implementation of policies geared towards the attainment of a national vision. With the aim of transforming the nation from an upper middle-income to a high-income country, the transformational Botswana Vision 2036 that defines the aspirations and goals as a people, has emerged from the ashes of the maiden edition. In order for Botswana to achieve prosperity for all, Vision 2036 is leaned on four pillars including: 1) Sustainable Economic Development, 2) Human and Social Development 3) Sustainable Environment and 4) Governance, Peace and Security.

In pursuing its goals, a university normally considers and incorporates the agenda of the nation where it is located. At the HEIs level, especially, the premier University of Botswana, having competitive advantage over other HEIs in Botswana had begun elearning/ICT initiatives, and strategic plan to 2016 and beyond, among others. Other institutions of higher learning are obviously also following the pace of the University of Botswana. In order to ensure efficient delivery of quality teaching, learning and research activities, higher education libraries have the mandate to empower staff and students with a range of information resources and information literacy skills and promptly make them available or accessible. Whilst the HEIs are under pressure to deliver well-trained and skilled human resources to meet the increasingly sophisticated demands of the workplace, some glitches attempt to curtail the feat that would have been attained. For instance, the challenge of inadequate subvention received from the

Government seems to make it difficult for the institutions to renew the contracts of the expatriate staff, and many professors who would have assisted in leading and carrying out quality research leading to innovation activities have left or are in the verge of leaving. Of course, Covid-19 pandemic also struck and took its toll on research, teaching and innovation, as well as library and information service in institutions of higher learning.

LITERATURE REVIEW

Academic services at higher education institutions can easily be considered or alluded to as academic support services such as counselling and psychological support, living and learning communities (LCC), disability support, specialized learning support, financial support and cultural activities, among others. In the context of this study, academic services are measured by or regarded as the services offered by the academic staff, faculty or lecturers in the institution. Primarily, such services include teaching, learning and research. This is in line with the definition of IGI Global (2021) that refers to academic service as all the academic services provided by academic staff in teaching and learning to students. This review will therefore focus on teaching and learning, as well as research responsibilities that academic staff carry out in universities, as well as the issue of fourth industrial revolution as descriptors in this study.

Discussing about the teaching role of faculty members, Hamrick (2021) observes the role reflects their centrality in addressing the primary educational mission among colleges and universities. It adds that as faculty members teach, they disseminate and impart basic or applied knowledge to students and assist students with the learning process and applying the knowledge. In its discourse on effective teaching strategies, University of Leicester (2020) asserts that the traditional form of teaching in a university often involves lectures being given to large groups of students, accompanied by tutorials and workshops, with some independent study. The university reminds its readers of the flipped classroom which involves asking learners to watch video content before the class session, and devote in-class time to exercises, projects and discussions, and problem based learning which is considered a student centred approach, where students learn about a subject through understanding and solving problems. University of Leicester still offers other modes of delivery in teaching and learning that can also be very effective. These include teaching large groups (lectures); small group teaching; demonstrating in practical classes;

massive open online courses (MOOCs); active learning, which explores teaching and learning methods that put the student in charge of their own learning through meaningful activities; work based learning, which provides students the opportunity to learn through real-life work experiences; blended learning, which combines traditional classroom teaching with online learning and independent study; and student-led learning, where students work together to support each other's learning.

Writing on what makes a good university teacher, Denium (2020) believes there are still many uncertainties on what works and what doesn't in teaching students at university. He therefore suggests some teaching activities, derived from the work of van de Grift (2014) would be effective in higher education. The activities include ensuring academic and stimulating climate, **e**fficient organisation of the teaching session, clear instruction (what you want students to learn at a session), activating learning, focusing on (learning) strategies (meta-knowledge), and being able to differentiate between students; personal interests, prior knowledge, abilities, motivation, individual goals, cultural background, etc.

On research, Hamrick (2021) states that research is commonly associated with conducting empirical studies, whether confirmatory or exploratory, but in some academic disciplines research also encompasses highly theoretical work. Hamrick affirms that many university faculty members engage in research, thereby contributing to the knowledge base of the discipline or academic field. Blasi (2006) states that a word which synthesises well the need for new approaches, new solutions and new educational targets is "innovation". He therefore advocated the necessity to innovate in every field including technology, social sciences, politics, organisation, etc. He believes that in order to innovate, there is the need to develop research activities in all these fields, and train more and more people to have an active role in research, in research transfer and in exploitation of research results. At the higher education institution, Hamrick confirms that higher education institutions are most often the sites for and sponsors of faculty members' research. However he notes that the primary audience for most academic researchers is their national and international community of disciplinary colleagues. Hamrick adds that the extent to which faculty members have a research role as part of their work responsibilities depends largely on the mission of the employing institution, with larger

universities more likely to have research and knowledge creation as a significant part of their missions.

Klaus Schwab is the founder and Executive Chairman of the World Economic Forum and the proponent of the fourth Industrial Revolution. Whilst acknowledging that it is the beginning of a revolution that is fundamentally changing the world, World Economic Forum (2022) claims that the resulting shifts and disruptions mean that we live in a time of great promise and great peril. The revolution he notes is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries and even challenging ideas about what it means to be human.

Zeleza (2019) confirms that the term (fourth industrial revolution) often refers to the emergence of quantum computing, artificial intelligence, internet of things, machine learning, data analytics, big data, robotics, biotechnology, nanotechnology, and the convergence of the digital, biological, and physical domains of life. It is remarkable to note that some of technologies had been in existence for a long time. For instance, Mudongo (2020) claims that the concept of AI is not new. He affirms that AI in different forms has existed for over 60 years and that the difference now, as technology advances every day, is the increasing application of AI in the automation of jobs traditionally performed by humans. Thus, fueling concerns about the robots coming to take jobs. Karandish (2021) also appears to support this view when he affirms that AI-powered solutions have been in the Educational Technology (EdTech) space for some time, but bemoans that the industry has been slow to adopt them. In his views on the benefits of AI in education, Karandish (2021) listed some areas including personalization where students can have a personalized approach to learning programs based on their knowledge, speed of learning and their desired goals; tutoring that would assist students and answer their questions at a response rate of 2.7 seconds when they require extra help outside the classroom; and universal 24/7 access to learning anytime and anywhere without incurring travelling and living expenses. Other benefits according to where students own unique experiences and preferences.

Writing on the role that education will play in Fourth Industrial Revolution, Menzied (2016) believes that altering higher education is more necessary than ever before. He observed that with

the reduced public financial support for higher education, universities need to think strategically regarding methods to utilize their experience in credentials, trust and identity to offer new services. He asserts that it is no longer an option to keep doing things the old way, affirming that innovation and accepting change are now prerequisite for survival. Menzied further suggests combining the strength of the traditional higher education with the increasing trend of MOOCs represents necessary steps to scale quality education. In this respect, Zeleza (2019) clearly articulates the teaching methods increasingly driven by artificial intelligence and technology that include immersive technology, gaming, and mobile learning, as well as MOOCs, and the emergence of robot tutors. He states that in some institutions instructors who worship at the altar of innovation are also incorporating free, web-based content, online collaboration tools, simulation or educational games, lecture capture, ebooks, in-class polling tools, as well as student smartphones and tablets, social media, and e-portfolios as teaching and learning tools.

Iberdrola (2022) acknowledges that all revolutions have benefits and drawbacks, challenges and opportunities, uncertainties and certainties. In the case of the Fourth Industrial Revolution, he asserts the advantages are evident including increased productivity, efficiency and quality in processes, greater safety for workers by reducing jobs in dangerous environments, enhanced decision making with data-based tools, improved competitiveness by developing customised products that satisfy consumers' needs, etc. Examining the drawbacks, Iberdrola (2022) states that the drawbacks are concerned, the experts point to many: the dizzying speed of change and the need to adapt, burgeoning cyber risks that force us to ramp up cybersecurity, high dependence on technology and the so-called digital gap, lack of qualified staff, etc.

Study Setting

The study focused on two public higher education institutions comprising the premier University of Botswana (UB), and Botswana Open University (BOU). Whilst one operates the traditional face-to-face delivery mode, the other functions as a distance teaching institution with its students scattered across the country. The two public institutions were considered more involved in the use and application of technologies in the discharge of academic services in Botswana. For instance, University of Botswana had integrated information and communication technology into the entire education process culminating in recruiting a consultant and forming the University of

Botswana E-learning Team (UBel) in 2001 to spearhead the implementation of an e-learning programme at the university (Mutula, 2002). Uys (2002) states that the UBel team is required to keep abreast of e-learning developments internationally, draft relevant policies regarding e-learning, embed into academic and administrative support structures, promote interests in e-learning at the University and make recommendations on matters relating to policy, pedagogy, copyright and intellectual property. In addition, they promote research and monitor quality. Almost on monthly and rotational basis, the Centre for Academic Development (CAD) runs a number of e-learning workshops for lecturers and any member of UB staff who may offer themselves for training. Some of the Workshop titles that CAD offers include: Effective Use of Multimedia Graphics, Introduction to eLearning, Introduction to Moodle, Instructional Design for eLearning, Teaching in the Technology Enhanced Classroom, PlagScan and Moodle Assessment tools. The workshops are arranged either specifically for departments or mixed groups of people.

Botswana Open University (BOU) is a result of the transformation of Botswana College of Distance and Open Learning (BOCODOL). The institution was developed to meet the growing local demand for open and distance learning (ODL) tertiary level programmes by the Presidential Directive CAB 37 A of 2011 which paved way to BOCODOL's transformation into an Open University. Subsequently, the Botswana Open University Bill was presented to Parliament ultimately passed by the Parliament on the 20th July 2017 (BOU, 2021). As a distance teaching and learning institution, BOU naturally makes tremendous use of technologies for its distance programmes, even as its library offers service to its ubiquitous learners. Though with branches in a few places across the country, the main campus of each of the two institutions is located in Gaborone, the capital city of Botswana.

STATEMENT OF THE PROBLEM

It is now about seven years, specifically since 2015 when Klaus Schwab the renowned founder and Executive Chairman of the World Economic Forum announced the advent of the fourth industrial revolution. With the involvement and fusion of technologies in the 4IR and the consequent effect of change in the way humanity live, work and related with each other, it is obvious that higher education institutions cannot stand aloof and not be involved, especially in

the teaching and learning process, as well as their research work. Artificial intelligence is one of the technological components applicable for the 4IR. Mudongo (2020) notes that developing economies, especially in Africa, express the belief in the need to embrace Artificial Intelligence (AI). He observes that AI in different forms has existed for over 60 years but the difference now, with advancement in technology is the increasing application of AI in the automation of jobs traditionally performed by humans.

The issue can then be raised that in teaching and learning process at the HEIs, probably the application of AI and other 4IR technologies have been incorporated especially since e-learning and library automation have, for more than twenty years, been introduced at the premier university in Botswana. A peep into the available 2019 Government AI readiness index compiled by Oxford Insights (2019) with the support of International Development Research Centre (IDRC), reveals that Botswana records 3.210 and compares with other developing countries like Nigeria with 3.612, Namibia's 3.422 and Egypt's score of 3.492. A thorough search of extant literature to see a more recent index did not yield any result. How are the HEIs doing in their core activities of teaching, learning and research?

In his analysis of the advent of 4IR, Schwab (2017) expressed some grave concerns: that organizations might be unable to adapt; governments could fail to employ and regulate new technologies to capture their benefits; shifting power will create important new security concerns; inequity may grow; and societies fragment. Anecdotal evidence based on a quick panoramic survey of the online teaching and learning process, as well as the libraries in the HEIs of study seems to suggest that the fear of Schwab is not misplaced. Academic services do not appear to have taken the required stride in the march towards the 4IR in Botswana in so far as the incorporation of AI and Internet of Things (IoT), among other technologies are concerned. It is not quite clear if these institutions are partially, or completely into the 4IR or not ready at all for the new challenge. It is in this respect that this study is undertaken to achieve the objectives detailed out below.

OBJECTIVES OF THE PAPER

The main objective of this paper was to assess the conduct of academic services and hiccups

faced in two selected higher education institutions (HEIs) in the 4IR Botswana. The specific objectives were to:

- Determine the current academic practices in terms of teaching, learning and research vis-à-vis the application of technologies in the selected institutions
- Examine the hiccups that confronted the institutions and how such are mitigated in the pursuit of their academic services
- Establish how the institutional libraries are keeping pace with the hiccups brought about by COVID-19
- Offer necessary recommendations

METHODOLOGY

The research paradigm adopted for this study was interpretivism with qualitative approach. Punch (2013) defines interpretivism as the philosophical situation in which people bring meaning to a position, and understand their world, behavior and influence through the use of these meanings. It also generally reflects the values, experiences as well as biases of the researcher (Szyjka, 2012). Data was collected through semi structured interviews conducted on purposively selected four senior academic and library staff members from each of the two selected institutions. Interview data were complemented with the use of documentary sources as data collecting tools. Official pamphlets, leaflets, flyers, and the webpage of the respective institutions, among others, were considered useful information sources. Thematic analysis was employed for data analysis following the assertion of Braun and Clarke (2006) that it supports flexibility and demarcation in capturing the themes as they emerge.

FINDINGS

The first objective of the study sought to determine the current academic practices in terms of teaching, learning and research vis-à-vis the application of technologies in the selected institutions.

When inquired on the teaching practice at the University of Botswana, respondents affirm that

teaching currently holds both online and face-to-face depending on the choice of individual lecturers. A respondent notes that *'currently lecturers adopt a blended or hybrid approach for teaching in UB. Some carry out the teaching remotely from their homes, whilst some remain in offices to do their teaching online using either Moodle or Ms Team – two most common platforms we use.* Another respondent said, *when Covid-19 came, the University Management offered to give loans to the academic staff to acquire a laptop (with some specifications) to teach. Whilst some find it unfair and rebuffed the loan, others obtained it. But I can tell you that currently many teach from remote locations using their own laptops.* Another respondent said, *teaching is undertaken remotely and on digital platforms. So whether you like it or not, you go for a laptop to do the teaching and the purchase of your own laptop is the sacrifice and contribution a lecturer has to make.* How about the necessary training to use the online facilities to teach, a respondent said University of Botswana has a Centre for Academic Development with a unit of educational technology (EduTech). The EduTech Unit offers staff a range of training on e-learning almost on daily basis. When inquired about the general experience of the lecturers to the rapid move to online teaching, one respondent said *though EduTech never stopped offering its various training on online teaching or e-learning, it was never made mandatory. Now that everyone is trying to learn and teach online, there are some occasional hiccups probably caused by insufficient bandwidth or line break down from Botswana Telecommunication Corporation (the Internet supplier to the University) when the students don't hear the lecturers or someone is thrown out and you have to log-in again. By the time you are back some precious lecture time is lost and some students are gone. But we are matching on! One good aspect of the online teaching is that it makes virtual learning possible to the point of disseminating knowledge across borders to students who are out of Botswana.*

When asked about the students learning situation, the respondents explained that the University of Botswana went into an arrangement with Mascom, an internet service provider, which gave each student a Mascom Sim-Card and their respective numbers documented. In preparation for each day's lesson, the students' sim-cards are loaded around midnight with 1GB (gigabyte) internet bundle. The students use the bundle to access the online live teaching on their mobile phones. Notwithstanding, the computer laboratories are still available for the students to connect

with lecturers and learn online. The regret of one respondent was that '*despite the offer of the Internet bundle and availability of the computer laboratories with Wi-Fi connectivity facilities which students can use to undertake the teaching and learning process, many do not attend classes. What we observed is that, the sudden switch to online teaching and learning has brought about the lowest class attendance of students in years. But the good news is: the lectures can be recorded and a willing student could listen to them at their convenience.*

Any university is also expected to carry out research as a mandate of their academic service in addition to teaching. When inquired on how research has been currently proceeding, a respondent said *research has been very slow at the moment, especially empirical research that involves going out to collect data through self-administered questionnaire. Mostly at the moment, its theoretical or desktop research that colleagues have been working on. There are however pockets of individuals who are able to do empirical studies by sending out their questionnaire online to their subjects or respondents.* The respondents were asked if they knew of anyone or any department that has incorporated the use of technologies like the Internet of Things, Artificial Intelligence or any other type of technologies associated with the 4IR into their teaching/learning or research process in the university. The response was an emphatic NO! One respondent said, *Not even in the Department of Computer Science or Faculty of Technology! You know, I have been hearing of those technologies like AI, Internet of Things that you mentioned, but the truth is, I do not understand how they function in education. But I know it would have been blown from the roof top if such things were happening anywhere in Botswana. Our universities have enough machinery and propaganda to disseminate novel information taking place in their ambience.* Whilst writing on what he described as 7 benefits of AI in Education, Karandish (2021) states that AI has the power to optimize both learning and teaching, helping the education sector evolve to better benefit students and teachers alike. Conversely, injection of IoT in education has a lot of benefits. The benefits, according to Digiteum Team (2020), include real-time data collection, improved resource management, global interconnectedness etc. whilst some issues that need to be overcome include high implementation cost and security and privacy concerns.

At the Botswana Open University (BOU), an open and distance teaching institution, a learning portal was created through its Centre for Instructional Technology (CIT). The CIT works in

partnership with Schools and other relevant Departments to develop a variety of E-learning instructional materials aimed at enhancing student learning. The overall objective of the CIT is to ensure the effective use of technology and the provision of flexible learning and teaching environment for the BOU students (BOU, 2021). During the interview, a respondent indicated that the learning *portal houses course materials, students assignments are posted in the portal and students access the assignments and submit through platform for marking. It is used as a forum for discussion. Any audio/video materials that the tutor wants the student to view are also uploaded in the portal.* For learning purposes, the respondent said *BOU teamed up with Mascom, an internet service provider to provide zero rated services for our students to be able to access their resources and services online for the period. Using various platforms,* a respondent notes that *live classes, pre-recorded classes, online timer-based assessment questions are made possible.* The respondent reported that *at a time, the tutors, as well as the students were all given an iPad which they used for teaching and learning, browsing the web, reading and sending emails, reading e-books and full-text of journal articles, among others.*

E-learning at Botswana Open University (BOU) is about ensuring that the institution is at the forefront of innovative quality online learning, delivering blended flexible technology-driven teaching and learning through open and distance learning mode. The aim, according to BOU (2021) was to offer students accessible and flexible learning experiences through the use of cutting-edge instructional technologies for an anytime, anywhere, at any pace learning experience through the use of Information and Communication Technologies (ICT) systems. Knowing that the students are scattered across the country and possibly beyond, the study specifically inquired on how teaching was done. The respondent said: *Don't forget we do the teaching through the written modules and that the modules are loaded in the portal for the students to access.* The respondent noted that *the occasional tutorial and, or teaching is done either synchronously, which is real time teaching or asynchronously. In the synchronous, the students can actively participate in the live teaching, whilst the teaching is recorded in the latter and students can access the taught and recorded lesson at their convenience.* The respondent further adds that *Google Meet platform is used for induction and live tutorials.* Asking about research activities at the moment in BOU, the respondent said *our research activities were affected by Covid-19 outbreak, as much as planned exchanges and visits were also affected.*

Some of those exchanges were eventually done online.

Before the Covid-19 pandemic and the disruption of academic programmes it heralded in the universities, most teaching and learning processes were carried out through the traditional face-to-face mode, though there are pockets of online teaching which lecturers were encouraged to undertake. Whilst it can be said that a fair ground has been covered in higher education institutions in Botswana, Li and Lalani (2020) stress that while some people believe that the unplanned and rapid move to online learning – with no training, insufficient bandwidth, and little preparation – will result in a poor user experience that is unconducive to sustained growth, others believe that a new hybrid model of education will emerge, with significant benefits.

The second objective of the study sought to examine the hiccups that confronted the institutions and how such are mitigated in the pursuit of their academic services. When inquired on the challenges confronting the University of Botswana, a respondent said the main challenge of the University was probably cash crunch, which is having a serious impact on the operations of the institution. The respondent said: *Yes, covid-19 dealt a blow on the university in recent years, but the problem of money had been in existence before the advent of Covid-19.* Another respondent recounts *the exodus of professors and senior expatriates whose contracts were not renewed even though they were vibrant and contributing meaningfully to the advancement of teaching, learning and research at the university. The unfortunate thing* according to the respondent is that, *some vacancies left as a result of non-renewal of contracts of expatriate professors are yet to be filled. How we are coping? Well some lecturers and even Heads of Departments now teach four, five or more courses. With respect to research at the exit of the professors, most of the Departments are experience a great lull at the moment. I suspect that would be observed in the recently concluded performance management system (PMS) where staff performances are annually reviewed.*

Another respondent said, *I will consider the intrusion of Covid-19 pandemic as the greatest challenge to the academic services of teaching and learning and research in recent years.* He said *the pandemic caught everyone off guard, but another great challenge to the academic staff in their onerous tasks is the criterion imposed on the academic staff to source for and bring research funding to the university before you can be promoted. Many academic staff considered*

this mandate not only an unnecessary distraction you don't see in other universities, but also one that turns them to go about with begging bowls when they have serious academic work to do. The respondent noted that *in other climes, you are rewarded and staff's account is credited with some amount of money the moment you are able to publish a paper in a recognized and peer reviewed academic journal.* At BOU, the main challenges stated were also Covid and funding problem. The respondents were quick to point to the staffing in the library as an instance, where there are four branches, including the main library with only six librarians.

The third objective of the study was to establish how the institutional libraries are keeping pace with the hiccups brought about by COVID-19. The libraries of the two institutions of study had their webpages, as well as social media platforms especially Facebook and Twitter where they advertised their services and could also be reached by their customers. They also had their respective digital repositories that showcase the research work and, or other digital assets of the institutions. When inquired of the academic respondents if they had their published works in the repository, only two of the four academics interviewed in UB claimed their published works were deposited in the repositories, even then, they indicated only a few of their publications were there. At both institutions of study, virtually everyone interviewed said there was no serious demand to deposit or upload their work/publications in the digital space. When asked to state if the academics were trained on how to deposit their contents in the repositories, one respondent was emphatic in saying NO! Another said, *there was an attempt long time ago to train staff on uploading their publications, but I don't think anyone was interested.* When asked if they would be willing to release their publications for the librarians to upload, five of the eight respondents responded in the affirmative three felt there was no need. The implication of the unwillingness to assist in populating the repositories is denial and defeat of the purpose of the repositories including denying the students unassailable access to the resources of their lecturers. When inquired about how the library services were offered during the peak of Covid, one respondent said *just like everyone was under lockdown, the physical facilities too were shot down. But it was possible for the students and researchers to have access to some services like e-resources, even when the library was shot down. When the lockdown was lifted and the university was back in session, the fear Covid brought still lingers and there was increasing reduction in the number of users coming to the library in-person.* When asked if the library was coping to meet the

information needs of users even with Covid, the respondent said, *we try meet the needs when requests are made either via email or on our online platforms, we join the Communication and Study Skills Unit (CSSU) to teach information and literacy skills, but the truth is that requests are now minimal and users stopover in the library has greatly diminished.* At BOU, the capacity of staff is limited with only 6 librarians upholding the Institutional Continuity Plan at the main library and its three branches in Gaborone, Francistown and Maun. For reasons of the students' dispersal, the library encouraged the students to use the online facilities and participate on WhatsApp group platform. When respondents were asked to state if there was any evidence to suggest that students were making good use of the e-resources, the response received was w*e believe so, though they probably use a fraction of what is available.* If the library is well funded and financial constraint is removed, what would the library do? The respondent said *we need to hire more hands, support research and training and build our collection including the repository.* Whilst they would not want to admit, it emerged that much as they were making efforts, the two institutional libraries are struggling to cope with providing appropriate services to their customers, trusting that their e-resources available online would do the job.

DISCUSSION

Although this study was limited to two higher educational institutions (HEIs) with different educational mode of delivery, one distance, the other traditional face-to-face, it has nonetheless brought about a number of issues on the academic practices in Botswana. The issues oscillate around the current academic practices in terms of teaching, learning and research vis-à-vis the application of technologies in the selected institutions, the glitches that confronted the institutions and how such are mitigated in the pursuit of their academic services and how the institutional libraries are keeping pace with the hiccups brought about by COVID-19.

With respect to the current academic practices in terms of teaching, learning and research vis-à-vis the application of technologies in the selected institutions, this study established that teaching currently holds both online and face-to-face in what is referred to as a blended or hybrid approach for teaching in UB especially during Covid. The situation is the same at BOU but with greater emphasis on e-teaching/learning since it is a distance teaching institution. Though there had been a lot of effort on e-learning prior to the Covid pandemic, the results revealed that more adherents appeared to have been coerced to use elearning platforms at the advent of Covid.

Abrahamsson and Lopez (2021) appear to strengthen this view when they indicated that due to the worldwide COVID-19 pandemic, new strategies had to be adopted to move from classroom-based education to online education, in a very short time. The lack of time to set up these strategies, hindered a proper design of online instructions and delivery of knowledge. Ntereke et.al (2021) appear to be more precise with what was in vogue with respect to the results obtained when they note that the rapid transition from the traditional method of face to face classroom teaching to remote teaching during COVID-19 pandemic raised unprecedented challenges for lecturers as they were required to integrate digital technologies in learning and teaching.

Research is another core service that the academics offer. The findings revealed that the research activities in the two institutions were affected by the pandemic. Though silent on quantitative study, the University of Edinburgh (2021) has some words for researchers who may want to collect qualitative data. The institution notes that digital platforms like Teams, WhatsApp, Skype, Zoom, and Facebook can be used to conduct interviews and focus groups/discussions. The University further asserts that WhatsApp has been especially useful for researchers working in the global south, due to its simplicity, wide use, and efficiency; adding that Microsoft Teams and Skype can be used with external interviewees, and both have recording options. This study believes digital platforms including emails can also be utilized to collect data as well.

On the second objective of the study that sought to examine the hiccups that confronted the institutions and how such are mitigated in the pursuit of their academic services. The findings revealed that in the two institutions of study, there were two main challenges identified by the respondents. These include cash crunch and Covid disruptions. It appears from extant literature that inadequate funding are not peculiar to institutions of higher learning in Botswana alone. Hess (2021) affirms that in a recently released survey of over 700 higher education professionals by the Association of American Colleges and Universities, 74% of respondents said the most significant challenge facing their school is financial constraint. Though the problem of financial constraint had been in existence in the two institutions of study before the advent of Covid, perhaps the pandemic applied more pressure on it. Funk (2021) affirms that the COVID-19 pandemic brings to the fore strengths and weaknesses in many public policies, including higher

education. Funk further emphasizes that there are at least three separate but related areas where institutions of higher learning have been stressed by COVID-19: financing, issues related to the logistics of learning, and inequality.

With respect to the third objective that attempted to establish how the institutional libraries are keeping pace with the hiccups brought about by COVID-19. The findings from the two institutional libraries revealed their reliance on the e-resources available through their webpages, though none could show any evidence of use of the resources. Decker (2021) states that the COVID-19 pandemic, which hit academic libraries forced librarians and staff to redouble their efforts to reach out to users in light of newly enforced safety measures such as building closures, quarantine periods, enforced social distancing, etc. In their submission, Mehta and Wang (2020) believe that the COVID-19 crisis has brought digital libraries into the limelight through the many benefits it has to offer, which were in the past unseen or non-existential. They further note that digital libraries are demonstrating their potential by providing richer and free e-content and online services of high quality. On the issue of digital repositories, partly for reasons of inadequate staffing or non-cooperation of academic staff, it was established that in the two institutional libraries, adequate attention was not given to populate them. Allan (2009) citing Abbott (2006) states that repositories must be sustainable, trusted, well supported and well managed in order to function properly. Denison (2007) also adds that in digital repositories content is deposited, whether by the content creator, owner or third party and that the repository must be sustainable and trusted, well-supported and well-managed. Examining the significance of repositories, Denison iterate they provide targeted services including enhanced access to resources; new modes of publication and peer review; corporate information management such as records management and content management systems; data sharing, including re-use of research data, re-use of learning objects; and preservation of digital resources.

CONCLUSION AND RECOMMENDATIONS

Digital technologies such as artificial intelligence (AI), the Internet of things (IoT) among others are known to be the drivers of the Fourth Industrial Revolution. The World Economic Forum (2018) posited that the digital technologies of the Fourth Industrial Revolution are fast becoming

the engine of change throughout all sectors of the global economy. Whilst evidence abound that technologies are applied in academic services including teaching, learning and services at HEIs in Botswana, it cannot be that there is any shred of application of the technologies noted for the 4IR. When one of the respondents was asked if any institution of learning is applying any of the 4IR technologies in Botswana, to the best of his knowledge, his response was '*we are not even near it in Botswana'.* It is now more than five years since the declaration of the commencement of the Fourth Industrial Revolution, yet we are far from it. Even some cases as seen in the findings, it was the outbreak of the Covid pandemic that coerced some lecturers to pay attention to its expediency before they started to use elearning platforms to teach.

Whilst the HEIs are under pressure to deliver well-trained and skilled human resources to meet the increasingly sophisticated demands of the workplace, some hiccups attempt to curtail the feat that would have been attained and pose a great challenge. For instance, the challenge of inadequate funding seems to make it mandatory for the academic staff to hunt for research grants as a vital criterion for promotion in some instances and non-renewal of contracts for several professors who would have assisted in leading and carrying out quality research and innovation activities. Of course, Covid-19 pandemic also struck and took its toll on research, teaching and innovation, as well as library and information service. In the light of outcome of the study, the following suggestions are offered

- Training workshops should be organized regularly so that both the academic staff and librarians can be trained in various e-platforms. For instance, almost on monthly basis, Centre for Academic Development in UB releases its schedule of e-learning workshops.
- Librarians should not be complacent on relying only on e-resources for their clientele. They should device marketing strategies to advertise their services even in times of pandemic and need to be more skilled and equipped with the use of technologies and be innovative.
- Librarians should resuscitate alliance with the lecturers. Findings from the study reveal that requests from the libraries are minimal these days: Library need to resuscitate their collaborative partnership with academic staff to market and provide their services to the different categories of users

- Use digital media to collect research data. It is established that various digital platforms such as Teams, WhatsApp, Skype, Zoom, and Facebook, among others, can be used to conduct interviews and focus groups/discussions. Academic staff should also adopt these e-media platforms to collect their qualitative and quantitative data
- Lecturers should run away from techno-phobia syndrome. The two institutions studied created opportunities for lecturers to learn and use various elearning platforms on continuous basis. The teaching staff should always be committed to learn and stay tuned to the emerging technologies with a view to adopting them for the benefits of their core business including teaching, learning and research
- The mandatory idea that lecturers should hunt for research funds to get promotion should be halted. Traditionally and universally, academics have requirements for promotion. For instance, apart from other services to the profession and community, publishing a number of articles in reputable journals and having them indexed in international databases like SCOPUS, Web of Science etc. should suffice
- Universities should partner with and advise the Government on the technological requirements for the new world.

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LEVERAGING DIGITAL TRANSFORMATION TO IMPROVE CUSTOMER EXPERIENCE IN TERTIARY EDUCATIONAL INSTITUTIONS (TEIS): THE CASE OF UNIVERSITY OF BOTSWANA

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Abstract
The covid19 pandemic has shown how rapidly the educational setup is changing, and there has never been a better time to put the customer (students) at the centre of the educational service sector than now. It has compelled businesses to relook and reimagine customer experiences in a digital and more connected world. The phase has changed how all involved stakeholders in the educational setup perceive educational delivery and assessments forcing digital interventions to be adopted. The digital transformation blew to unimaginable standards both within the developed and developing nations to cater for the educational sector customer-students, who were at a cost of losing almost two (2) years of learning and assessments. This culminated in innovations and new ways of addressing the educational setup leading to total customisation for the educational sector. Total customisation it's an essential part of customer experience to such an extent that the 'same' service or product experienced by more than one customers may share no surface commonalities, and hence the importance of leveraging digital transformations to improve customer experience in tertiary educational institutions specifically for University of Botswana. It is very important to find ways of enhancing customer experience which has become the cornerstone of any company delving into digital transformations.

Keywords: *Customer Experience, Digital Transformation, Tertiary Education, E-learning, Digital Solutions*

INTRODUCTION

This study explores leveraging digital transformations to improve customer experience (CX) in Tertiary Educational Institutions (TEIs) with focus in University of Botswana (UB). Enhancing CX is a number one priority for organisations/companies/institutions pursuing digital transformation (DX) (Accenture, 2015). There are several positive effects that can be derived from DX and the main focus of this research is on how DX can be leveraged to improve CX. Some of the positive effects are improved operational efficiency and cutting of waiting times which have secondary benefits that lead to improving CX (Localz, 2016). The customer in this research is the student who enrols for a course in a Tertiary educational institution. According to KPMG (2021; 2020) the new corona virus pandemic has changed the way customers look at products and services and that compels businesses to reimagine CX in a more connected and

digital world. Improving CX is directly linked to an increase in revenue generation as well as acquisition of new customers. Positive word of mouth from existing customers after enchantment results in luring new customers. Why do organizations conduct surveys to request customers about their experiences while rich data can be gathered through customer interactions and be used to predict customer satisfaction? (Mckinsey, 2021). It is vital for Tertiary educational institutions to improve quality of existing valuable customer information and improve their satisfaction accordingly (KPMG, 2021; Tangül and Soykan; 2021). Information quality is a critical digital resource that enables a rapid response to customer needs (Bharadwaj et al., 2013). Most businesses are bringing customer data management in-house to enable them gain a greater visibility and control, which will leverage the power of data to compete and win on CX. (Deloitte, 2019). When designing great CX companies should exploit predictive data analytics capabilities (Mckinsey, 2021). Robotic Process Automation and Artificial Intelligence (AI), Internet of Things (IoT), augmented reality, virtual reality and blockchain are among the new technologies gaining popularity, and most organisations are trying to have a competitive edge by adopting these to enchant customers. Business are operating in the fourth industrial revolution (4IR) which is dominated by reimagining most of business models, by following DX approach to deliver customer value

BOTSWANA TERTIARY EDUCATION AND UNIVERSITY OF BOTSWANA (UB)

The tertiary education in Botswana is under the Department of Tertiary Education and Skills development. This includes Universities, University Colleges, Colleges, Technical and Vocational Training Centres. Many students enrolling for Tertiary education are sponsored by the Government of Botswana and University of Botswana is one Tertiary institution which students turn to choose from. University of Botswana also known as Mmadikolo loosely translating to parent of all educational institutions was established in 1982. It is also popularly known as UB and it is the first institution of higher education in Botswana. The university has three campuses with the main headquarters In Gaborone ad others in Maun and Francistown. UB has six faculties namely Business, Education, Engineering, Humanities, Science and Social Sciences and the University Of Botswana School Of Medicine. The institution has over 14000 students and above 2000 employees. It is one institution which has tirelessly revamped its technological landscape and moving towards more digitisation in its many functions.

RATIONALE FOR RESEARCH

It is plausible for UB to improve CX as this has also been exacerbated by the unprecedented challenges brought about by the new corona virus outbreak. UB strategy map includes customer satisfaction and to accelerate digitalization. The institution has embarked on various ICT strategies to make UB a great technology oriented institution. There are existing DX gaps with regards to improving CX and they should be identified and acknowledged. This study will explore how DX can be employed to improve UB CX by conducting a research to achieve objectives below:

AIMS AND OBJECTIVES

The basic aim of this research is to explore how DX can improve CX for UB.

OBJECTIVES:

- To critically examine the importance of DX in improving CX in tertiary educational institutions.
- To evaluate how digital solutions can assist in making better relationships with the customers.
- To generate practical recommendations for UB in how they can adopt DX to improve CX.

LITERATURE REVIEW

Introduction

There are several positive effects that can result from DX, however this literature review is focusing on how DX can improve customer experience (CX). In addition, there are several ways through which DXs are beneficial for organisations. This topic has limited academic literature in Botswana context and academic literature is even insufficient at a global context hence worth exploring. Hyvönen (2018) argues that academic literature about DX is scarce and cited that only 2.3% of articles published in the leading IS journals between 2007 and 2016 covered this topic. Also, Gerster (2017) argues that even though academic literature is not adequate on this topic, research on DX has gained significant attention in the past two decades. Another gap is that CX

has not been adequately studied in the context of this study. Academic databases literature from 2010-2021 limited to English language were searched by using this study related search terms. The search was also refined to only include scholarly journals, books, dissertations and theses and reports. The literature is composed of two focal sections where first sections examine how DX can improve CX. This is critical to examine in order to understand the reason why DX is the integral part of many companies' strategies. The second part explores the digital solutions that can be adopted to automate customer journey, improve operations and achieve superior CX.

Why Customer experience matters?

Companies of all types acknowledge that customers are critical stakeholders to their positive business results (Schmitt, 2010). Customers also want to be treated like they matter by service providers. (Meyer and Schwager, 2007); (Sharma and Chaubey, 2014) describe CX as the internal and personal response customers have to any direct or indirect interaction with a company. This interaction can include awareness, discovery, cultivation, advocacy, products, purchases and services. According to Grewal et al (2009) companies stimulate customers' senses through interaction and they have control over how customers feel or experience. On the other hand, customers always expect seamless service from educational institutions since there is a long journey involved between the two parties upon customer selection of the educational provider (Tangül and Soykan, 2021). Customers in turn expect more products and services which will support their journey especially with the pandemic era. Many educational leaders consider technology as either extremely important or very important to improving CX (The World Bank, 2020; Mhlanga and Moloi, 2020)

What is the need for digital transformation?

Depending on business size and sector, one will require different types of digital technology. Educational institutions in the educational setup have of recent adopted various e-learning technologies such as MS Teams, Zoom to ease student learning (Hye-jin Kim, 2021; Bozkurt & Sharma, 2020) and transformed the overall eduction landscap (Sun and Pan, 2021; Choi et al,2017; Brown-Martin, 2018). Payments are also done online with many interactions done via Moodle, Blackboard, and Institutions wireless pay points. On the other hand, some companies

are completely digital business models such educational institutions as Botswana Open University, The Open University in UK and many others. Today, one can find entirely new digital companies (like Uber and Airbnb). According to TechCrunch, they are the world's largest taxi and lodging company, but they do not own a car or hotel. They have moved away from the traditional business model. The leadership of organisations must understand why digital business matters (Schwertner, 2018). In this way, one will be able to select the best technologies and solutions that will enable improvement of CX. So the aim is to improve the user's experience, right?

Put the customer first

CX is the internal and personal response customers have to any direct or indirect interaction with a company (Meyer and Schwager, 2007). This interaction can include awareness, discovery, cultivation, advocacy, purchases and services. A company's goods and services might dictate which of the technologies and platforms it chooses to deploy and how to improve CX. There is a fundamental need of using customer intelligence tools to improve CX by using AI, and to drive customer-centric culture (Purcărea, 2018). It is also important for firms to rapidly assess if sophisticated technologies such as AI and robotic process automation (RPA) are appropriate for their usage once they've mastered the foundations of digital technology (Schwertner, 2018).

CX in the Digital Age

One of the motivating factors in adopting DX is the expectation that digital solutions empower organisations to interact and engage with customers. As digital-first, disruptors redesign the business landscape and customers' demands for more digital service is posing a serious challenge to incumbent in every sector (Ehrlich et al., 2017). The speed and convenience brought by digital solutions makes customers to expect more of similar seamless service from the organisations (Tangül and Soykan , 2021). Other positive outcomes are that by adopting DX agenda, organisations can increase customer satisfaction, customer enrolment, customer relationships and retention (Gleason, 2018; Choi et al, 2017; Netwong, 2013). One reason there seems to be a difference between ambitious digital transition plans and digital reality is that the goals of messaging services in educational services are too focused on internal interests rather

than external ones. This includes a focus on quick removing of students from system, cost reduction and internal profitability rather than customer benefits such as problem solving, simplicity, ease of use, and responsiveness, innovator all which build a quality graduate (customer). Many educational institutions do not understand the CX and do not prioritize improving communication and customer relationships. To them is receiving money from the government and waiting for the next batch. To meet the expectations of today's consumers, educational institutions must change the way they handle digital communication with customers, moving from minimal effort to key assumptions (Pramanik, et al., 2019). Below are five great service features for DX in the fourth industrial revolution;

1. **Multichannel is a new standard:** Today, consumers no longer differentiate between digital and offline connections. Fenton, Fletcher and Griffiths (2019) contend that emerging technologies are having a tremendous impact on businesses as customers increasingly embrace the benefits of the "always on" brought by DX. No matter which channel the customer is interacting with at the moment, they need an ever-changing experience.
2. **Habit is the best way to experience digital in 2022:** Knowing one's customers is not enough. Customers want brands not to store their data, but to use it wisely and understand their needs better. Customers are expected to gain a personal and enhanced experience in exchange of their personal information (Gedela and Valurouthu, 2016). If this exchange does not go through, they will notice. This new possibility of super-personal experience requires major changes in internal processes that are still lagging in real-time changes in the purchase path (Sebastian, et al., 2017).
3. **Waiting for an electronic digital tour:** One of the upshots brought by digitalization in the educational institutions is that the customers no longer need to visit the offices during opening hours but anything can be done remotely. No more traditional based classes but more flexible online classes. Digital transformation solutions must digitize all CXs and provide remote services on all available channels. It is no longer enough to digitize only part of the process but the whole process. Customers expect their digital journey to involve all communication with their brand from word go to finish-that is enrolment to graduation. Especially in educational services, the gap between consumer expectations

and reality is particularly pronounced on paperwork. The document problem has not really been solved, and the distinction between digital expectations and workflow reality is particularly clear. In many educational institutions, customers interact with lots of paper leading to more manual works. When it comes to sharing a good experience, stability is essential. Educational institutions need to improve the CX so that each point of use can provide a more consistent, convenient, and personal interactions experience throughout their stay in studies.

4. **Confirm data when posting to ensure data integrity:** The quality of the data entering an internal system is directly related to the quality of the messaging services that an organisation can provide. Digital analytics can help organisations identify new developments and discover new patterns of consumer behaviour. It also helps streamline customer communication processes to provide more satisfaction and therefore improve the bottom line (Indriasari, et al., 2019). The more accurate and precise the data, the more trusted and intergrity approval of an institution. Therefore, all data from all the angles of the institution concerning the custormer should be collected, confirmed and recorded automatically.
5. **Analyse and Optimize, Then Repeat:** The key is not to just collect customer information, but to use the information collected to consistently demonstrate to customers that their needs are met. One of the biggest challenges facing educational institutions is getting data and technology analytics to get an overview of the customer. When creating an automated and engaging user experience, flexible systems are often a major hurdle (Gedela and Valurouthu, 2016). Many base systems were not built for concepts like CX, making it difficult to connect these systems to modern devices and technologies (Abdulquadri, et al., 2021).

RESEARCH METHODOLOGY

Research Philosophy

Understanding of research philosophy is very important, as it shapes the foundation on how the research should be approached (Kiruna and Konini, 2017). There are various research

philosophies such as positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders et al, 2015). Thus, this study adopted the interpretivism approach. It is worth noting that different philosophies can be combined in a research (Kivunja and Kuyini, 2017), however the author decided to follow the interpretivism paradigm. Thus, this study adopts a qualitative approach. The study explores the reactions and feelings of customers as participants which are directly connected to their experiences when interacting with educational institutions for their journey to attaining their certificates. According to Mertiri (2018) qualitative method is the optimum choice for researching about DX since it entails dealing with people and their reactions. By employing a qualitative research the study was able to share findings from perspectives of participants. The nature of the topic compels the author to use only qualitative method for this study since its about gathering beliefs and perceptions of people.

Research Design

The research followed an exploratory design since it provides a window into CX. The applied research method to this study is qualitative method with the adoption of semi-structured expert interviews as well as a questionnaire to gather data from employees and customers. This works as a pilot study for a bigger research project.

Population Sample and Size

The research was executed in University of Botswana as a pilot study for a future full scale research. UB has amongst its goals to become one leading institution in digital technology thus they are accelerating the digitalization process for the benefit of their customers especially in the pandemic era and beyond. The research adopted purposive sampling, specifically homogenous sampling where some students who are the customers were selected and some double as employees of the institution; and the selected ones were in the Information systems and Information Technology departments. Purposive sampling is applied to make sure that individuals that are proficient and well informed with the phenomenon are selected (Campbell et al, 2020). In order to gather empirical evidence and have a balanced perspecting on how UB can leverage DX to improve CX three groups of participants were interviewed. Fifteen (15)

participants were interviewed as a sample population for this study with twenty (20) for questionnaire.

Semi structured interviews

An interview script was designed to collect data from the selected. IT had 28 open ended questions covering different sections within the customer journey. The researcher was guided by literature to come up with open ended research questions (Hair et al, 2019). According to Deng and Karunasena (2013) qualitative approach as part of the study enable the researcher to analyse various perspectives from the DX end-users and experts. Data were gathered through interview questionnaires seeking customers and UB employees' perspectives.

Research Questions

Below are the study questions and how they interlace with the objectives;

Objective 1: To critically examine the importance of DX in improving CX in tertiary educational institutions.

Q1: *How has the Educational Institutions' work with shaping CX changed due to the massive digitalization?*

This questions seeks to appreciate the reason why Educational Institutions are shifting toward DX. To intrinsically understand the impact brought by introducing DX, also understand if customer engage more due to availability of digital solutions.

Objective 2: Evaluate how digital solutions can help in making better relationships with the customers.

Q1: *How have the digital platforms affected consumer's interaction within the educational institutions?*

This question pursues to explore if digital solutions brought about a better CX compared to when there were only physical interactions. To also bring to light if there is DX brought convenience and speed as it is commonly stated.

Objective 3: To make practical recommendations for UB based on research findings in how they can adopt DX to improve CX.

Q1: How do Educational Institutions work towards improving CX in today's digitized society?

Q2: How do educational institutions market themselves towards their customers in today's digitized society?

These questions pursue to reveal a variety of digital approaches and solutions available towards improving CX. Also explore how educational institutions, create awareness, market their products and keep in touch with customer in the digital era.

Data Collection Methods

Data for this study were collected from both primary and secondary sources. Secondary data were collected from existing academic existing academic literature, business and technology articles and reports. UB strategy reports and DX plan were also being reviewed as secondary sources of data. A research interview questionnaire with eight questions was shared with the customers and another one with twenty-eight questions was shared with the employees to collect primary data. The semi-structured interviews were conducted in order to get a wide range of experiences from identified experts by allowing a bit of openness.

RESULTS AND ANALYSIS

Introduction - General Findings

Interview findings from most experts reveal that CX has improved in tertiary educational institutions' due to DX. Customers are now able to do their transactions remotely using their notebooks and or mobile devices, with many able to attend classes online. Educational material, promotions and advertising are easily advertised on social media and other digital platforms. Even though there are many benefits for adopting DX in the educational services industry the biggest shortcoming are cyber security issues and fraud which have limited and or contrained application of the traditional brick and mortar process to still be functioning the traditional ay without total movement to DX.

Findings from Expert Interviews

This process involved employing a Delphi technique where data were collected for three rounds of iteration from identified experts in DX realm, and in educational sector industry based on virtual conference calls using either zoom or Microsoft teams.

DX effect on CX

The participants in the expert group were asked to state how has the educational Institutions' work has changed in improving CX due to DX. All the experts answered based on their many interactions with their customers and surveys conducted on DX improvements on CX. Expert/AS (2021) states that the biggest factor has been the online classroom and online self service feedback. Expert/AU (2021) states that educational institutions have changed for the better as ease of access has been greatly improved and timely access has also been a great advantage. DX improves customer service through process optimization and self serving digitised process.

"A lot of processes which were manual back then are automated. Customers are able to interact with educational institutions remotely. Its easier to find Tertiary education information online nowadays, course and program offering, class interactions.Online program registration, online course registration, and many more services…" (Expert/AS, 2021)

Digital platforms effect on customer interactions

Here participants were asked how they think introduction of digital platforms has affected or can affect the customer interaction in the educational institutions. Expert/ BD (2021) expresses that digital platforms highly empower customers, and digital access allows them to perform fact checks before making decisions. Availing adequate information on products and services through digital platforms enable customers to make comparison between products and also get recommendations from other customers. Many Tertiary educational institutions have thus far met this criteria and left customers with choices.

"Digital platforms enable ease of interaction with fellow customers and service providers and reviews on customer satisfaction makes the decision on selection of service provider efficient and less stressful." (Expert/AZ, 2021)

Customers are now able to learn about tertiary educational brands in digital platforms from the comfort of their homes and seamlessly make decisions. They are also enabled to review brands and read other customers' reviews.

"Consumers are in a position to learn more about educational institutions online before they even do any business with them. Digital platforms brought convenience and speed. Digital platforms enable sharing of information faster and easy." (Expert/AS, 2021)

Even though there seem to be a positive correlation between DX and CX some interviewees felt there are also some negative effects brought by introduction of digital platforms.

"For the techno-savvy, their experience has been enhanced as more and more service became available online through digital platforms. The adverse can be said about the customers that are not techno-savvy, the transformation has forced them to adapt and adopt to the new ways of educational setups…both customers and ervice/product givers." (Expert/BA, 2021). *"The lack of physical presence might result in sending wrong messages or reaching inappropriate conclusion with nonverbal engagement."* (Expert/AZ, 2021)

Risks Associated with Digital Transformation

Adopting DX introduces several risks in educational institutions, these are threats that should be identified and mitigated. When questioning the interviewees about risks that may be associated with DX the common issues were around cyber security coupled with customer and digital literacy.

"Cyber Security is a big challenge in many countries, identity fraud, scammers, culture of adopting and using technology is still behind." (Expert/BD,2021) *"Security is the biggest threat. E.g what about if someone hacks the system and change marks to own specification..."* (Expert/ AT, 2021)

One unique risk raised is related to rushing to adopt DX without establishing a proper data management strategy. It is summed well by (Expert/BF, 2021) when stating that *"DX risks include rushing for solution development and neglecting the Data Management aspect which must ensure value derivation from data and data governance. Forgetting that at the core of Digitalization (Technological approach) lies data management (Business approach)".*

Customers' Findings

Customer experience is the internal and personal reaction customers have toward a company after any direct or indirect interaction (Meyer and Schwager, 2007). The first question pursues to understand how participants define CX in their own words, also to state how its improvement is important to them. Since CX involves customer's feelings it may mean different things to different people. Most of the interviews defined CX as how customers feel after being offered a service. In terms of its importance Customer/H (2021) expresses, *"It's very important because clients are different and need to be assisted differently in order to meet their individual needs hence giving them best customer service."*

"Improved CX assist in retaining customers and improvements that needs to be done to promote loyalty." (Customer/L, 2021)

Customer awareness

When customers were asked how digital solutions affect their awareness and consideration for products in educational institutions. They expressed their experiences in terms of how digital solutions assist them make quick decisions by availing a broad range of products for comparison.

"The use of digital solutions in educational institutions is very helpful because it made it easier for me to be more aware of the educational institution before I even enroled." (Customer/N, 2021)

"Digital solutions simplify product and services awareness, knowledge about anything can be speedily sourced from any location without extra costs like travelling and making calls." (Customer/E, 2021)

"Quick and easily accessible at one's finger tips, they are handy provided the systems are efficient." (Customer/M, 2021)

There are several virtual tools that participants stated that they use to learn. Among the tools the participants specified, they included MS Teams, social media platforms such as Facebook, Instagram, and twitter, literacy webinars, YouTube videos. A question enquiring if the customers usually search for recommendations online to increase awareness about any educational learning material indicated that the majority do so, especially youtube.

Customer consideration

In the consideration stage of the customer journey, the customer should have more knowledge about the product and or service from a tertiary educanal intituion in time.

"Digital solutions assist me in making proper sound decisions on what educational oinstitution to chose, program and courses to focus one." (Customer/G, 2021). *"I looked onto various platforms to confirm the institution I enrolled in."* (Customer/L, 2021)

Customer service

Customers expect to be kept up to date from the word go until thy graduate. In the educational institutions, at customer service stage, customers are contacted to be given a response to the application they have made. Digital channels can be used to enable this communication.

"Good customer service includes notification of anything new from the word go and it being made available and on time through quick means" (Customer/C, 2021). "Good customer service includes convenience or ease of use in accessing the services and all educational material I may need"(Customer/C, 2021).

Customer Advocacy

Participants were asked if they communicate online with their friends or family members when using educational institutions online services and majority agreed. They also stated that interactive online channels such as social media sites, chats in Moodle enable customer advocacy.

"To me a positive CX promotes loyalty, helps you retain customers, and encourages brand advocacy, thus more customers." (Customer/N, 2021)

Customer Monitoring

Monitoring customer behaviour enables improving CX by reading and deciphering their online comments, their likes and ratings to certain services/products online. Participants were asked if they will prefer being monitored online in order to improve their experiences. Most agree to be monitored provided there is consent and information gathered is used for valuable reasons. They also condone monitoring to be done if their data is protected. *"I do not have any problem as long*

as there is a plan to protect us users and our data from harmful parts of the web." (Customer/N, 2021). *"With my consent, I should be aware it's being monitored."* (Customer/A, 2021).

There are also those who are against their online monitoring for obvious security and invasion of privacy reasons as well as misapplication of data, however want it for data to be collected to improve products and services offered.*"I don't want my online behaviour to be monitored for safety reasons but at the same time the information collected can be used to recommend/ provide better products and better experience".* (Customer/H, 2021)

Employees Findings

The participants who interface with customers daily, those who develop digital solutions for the customers to improve CX were made part of this research sample. The survey was opened by probing the employees' familiarity with CX as a concept and they gave their definitions and even managed to link it to the customer journey.

"CX is the sum of all the interactions over the different channels that a customer has with an organisation over the life of their relationship. It is everything that affects the customers emotions, thoughts and opinions about it." (UB Employee/U,2021)
"CX is the ability to meet or exceed customer expectation through availing of solutions meant to close the identified gap in the market which solves or addresses growing customer demands. It also means understanding unique customer needs and developing tailored solutions to improve satisfaction levels." (UB Employee/AB, 2021)
"CX is everything related to a business that affects a customer's perception and feelings about it throughout the customer journey." (UB Employee/AC, 2021)

When they were further asked what CX mean to UB as a tertiary educational institution. Most of them seem to know the importance of customer's experience from the business perspective and its contribution to the bottom line, but stresses that this customer is a different one who needs nurturing. *"It is the cornerstone to driving the value proposition elements and ultimately attainment of educational goals of UB. A satisfied customer is highly likely to recommend others for more business as well as market the products to other prospects which become an advantage to a company."* (UB Employee/AB, 2021).

The participants were also questioned with regard to how DX is leveraged to improve CX and to state the current state of digital CX in UB. There seem to be different views in terms of the current state of digital CX. *"Deliberate efforts have been and are continued to be made and so far it is satisfactory. We have the channels such as Moodle, MS Teams and others to help our customer, and also us."* (UB Employee/U,2021)

"The University has a DX strategy which intends to promote the use of digital solution in the process leading to a seamless CX. The IT infrastructure is available within UB to support solutions and a number of solutions are being rolled out, especially in this years of Covid19" (UB Employee/AB, 2021)

"The state of our current digital CX in UB is that, it is not yet at the expected level but we are trying. There is still a lot of human and paper interactions with our customers". (UB Employee/Z,2021)

"The state of current digital CX in UB is still at developmental stage and there is more that can be done to make it even more fulfilling." (UB Employee/AA,2021)

CONCLUSION AND RECOMMENDATIONS

General Conclusions

The main question was how can DX be leveraged to improve CX in the tertiary educational institutions. The answer to this question is based on the literature review and participants' combined empirical data collected from this research. The introduction of integrated omni-channels across the customer journey and the ability to personalise customers' responses in harmony with their preferences will leverage CX within tertiary educational institutions. Easy to use, convenience, real time and secure are customer requirements to achieve superior CX. It is crystal clear from the literature review that proliferation of digital solutions in order to improve CX has even lead to change of educational. The digital Online learning (e-learning) model allows tertiary educational institutions to be able to move from bricks to click, where customers are given service virtually. Customers are served remotely and customers' data is collected using different platforms digitally. Furthermore, it has been shown that there is a positive correlation between DX and improved CX.

RECOMMENDATIONS

- Further develop UB website to be interactive and introduce a Chatbot to be able to share information with customers even beyond working hours.
- Share the current customer success stories via UB website and other social media to promote brand advocacy.
- Involve all stakeholders especially the customer in the journey DX to ensure the products rendered will improve CX.
- Future studies that seek to explore how digital transformation can be leveraged to improve CX should focus on one stage of the customer journey to allow for in-depth analysis

Study Limitations

- The broadness of Customer Journey
- Exploring how DX can improve CX requires the survey of the entire customer journey, so it is difficult to unpack information from every stage to the lowest level.
- Covid Protocols prohibiting meetings
- The researcher should observe customers interacting with digital solutions in order to understand their happiness or frustrations.

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DIGITAL TRANSFORMATION: BRIDGING THE GAP BETWEEN THE HAVES AND THE HAVE NOTS IN SOUTHERN AFRICAN PRIMARY AND SECONDARY SCHOOLS IN THE COVID-19 ERA

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Abstract
On 11 March 2020, the World Health Organisation upgraded the outbreak of COVID-19 to pandemic status. Due to the spread of the novel Coronavirus in 2020, several countries in Africa including Botswana, South Africa, Zambia, and Zimbabwe implemented partial or complete lockdowns. This caused a halt to the physical learning process, with a need to move away from using the usual face-to-face pedagogical methodologies and adapt innovative instructional strategies which integrate digital technologies. This is a concept paper that reviewed the literature on the significance of digital transformation in bridging the gap between the haves and the have nots. It looked at how digital transformation bridged the gap in Botswana, South Africa, Zambia, and Zimbabwe. These four countries were purposively selected because they play an integral part in the education sector in southern Africa. This study concluded that remote learning was the best method to give learners access to education and to enable participation, although it had some specific issues and challenges, including unfamiliarity with new technology and methods of dealing with unknown challenges, for many learners and their teachers, higher drop-out rates, and lowered academic achievement level. A proposed integrated framework on digital transformation for primary and secondary schools in southern Africa which bridges the gap between the haves and the have nots was crafted. The framework is likely to be feasible and of benefit to the countries that are struggling to balance the learning process amid the new normal which is remote learning.

Keywords: digital transformation, education, learners, southern Africa, Coronavirus, Zimbabwe, South Africa, Zambia, Botswana

1. INTRODUCTION

Worldwide, the education landscape has been undergoing unprecedented changes since the beginning of 2020 due to the disruptions caused by the outbreak of the coronavirus (COVID-19) pandemic. Countries throughout the world were forced to take drastic measures such as the declaration of a state of emergency to halt the spread of the disease. These measures included total lockdowns in either part of a country or an entire country to curtail movement and to force people to stay at home, as well as to maintain social distancing and isolation. Nearly 200 countries shut down schools with more than 1.6 billion learners, representing nearly 80% of the world's student population in primary and secondary schools were affected by the school closures (UNESCO, 2020). Several countries in Africa including Botswana, South Africa, Zambia, and Zimbabwe also joined the rest of the world and implemented partial or complete lockdowns. This caused a halt to the physical learning process, with a need to move away from using the usual face-to-face pedagogical methodologies and adopt innovative instructional strategies which integrate digital technologies (Ahedor, 2020; Sintema, 2020; UNESCO, 2020). As much as some schools saw online learning as the best method to give the student access to education and to enable participation, Teymori and Fardin (2020) affirm that online learning has its specific issues and challenges, including unfamiliarity with new technology and methods of dealing with unknown challenges, for many students and their teachers, higher drop-out rates, and lowered academic achievement levels, among others. The closure of schools inspired many education systems world-over to adopt remote teaching and learning. According to Ray (2020), remote learning provides an opportunity for learners and teachers to remain connected and engaged with the content while working from their homes. In the context of this study, all forms of learning that students experienced during the COVID-19 school closure are referred to as remote learning opportunities.The question is what did the countries in southern Africa do to bridge the gap between the haves and the have nots? This was mainly done through the review of literature on various measures undertaken by primary and secondary schools in different countries to make the paradigm shift to digital pedagogy.It is against this background that this paper proposed an integrated framework on digital transformation for primary and secondary schools in southern Africa which bridges the gap between the haves and the have nots. This

framework is likely to be feasible and of benefit to the countries that are struggling to balance the education sector amid the new normal which is remote learning.

1.1. Contextual background of the education sector in southern Africa and Covid-19

1.1.1. Botswana

Motshabi (2020) revealed that when Botswana enacted a six-month state of emergency and full national lockdown prior to any COVID-19 cases in the country, parents, learners, and teachers found themselves unexpectedly isolated in their homes. According to Tabulawa (2009), the Ministry of Basic Education (MOBE) oversees the primary and secondary education system in Botswana. A study done by Winthrop, Ershadi, Angrist, Bortsie and Matsheng (2020) discovered that when schools closed in Botswana on March 23, 2020, due to the COVID-19 pandemic, education administrators, teachers, and ultimately parents were faced with difficult decisions about how to help children continue learning without setting foot inside a classroom. In-person classes returned on June 17, 2020, though a second school closure occurred for two weeks beginning July 30 in greater Gaborone. Like almost all the other 200 countries that closed their schools, the education community in Botswana had to rapidly pivot to remote learning strategies, (UNESCO, 2020). Policy makers, school leaders, educators and education nonprofits quickly began to innovate with new ways of helping children learn (Angrist, Peter & Matsheng, 2020).

1.1.2. South Africa

According to Mhlanga and Moloi (2020) on 23 March 2020, President Ramaphosa instituted a national lockdown that would last for 21 days from 26 March 2020 to 16 April 2020. The lockdown meant that among other organisations that would immediately close were schools and all institutions of higher learning. On 9 April 2020, the President of South Africa announced that the lockdown would be extended by a further 14 days (Mhlanga and Moloi, 2020). According to Mhlanga and Moloi (2020) the national lockdown, it would mean that the school calendar for the year 2020 would be disrupted. The department of Basic Education partnered with some Non-Governmental Organisations to make learning materials available as a way of reducing learning disruptions. The primary and secondary education sector in South Africa is governed by the Department of Basic Education (DBE). South Africa has nine provinces: The Free State, Limpopo, KwaZulu Natal, the Eastern Cape, Western Cape, Northern Cape, Gauteng,

Mpumalanga, and the Northwest. These have provincial education departments that are responsible for implementing the policies of the national department, as well as dealing with local issues.

1.1.3. Zambia

To contain the virus, the government of Zambia took preventive measures, including closing schools (Daily Nation, 2021). Schools closed in 2020 due to high cases of coronavirus and since then normal school terms have been disrupted. To mitigate the impact of this situation and ensure learners continued to learn, the Ministry of General Education (MOGE) worked with partners such as World Vision to implement COVID-19 emergency response and recovery plan. According to Devex (2022), primary and secondary education in Zambia is managed by the Ministry of General Education (MOGE). MOGE facilitates education in ten (10) Zambian districts. The districts included Kabwe, Kapiri-Mposhi, Mpongwe, Mkushi, Kitwe, Kafue, Luanshya, Lusaka, Mazabuka and Monze.

1.1.4. Zimbabwe

According to Tshili (2021), President Emmerson Mnangagwa declared a 21-day "total" lockdown from March 30, 2020, curtailing movement within the country, shutting most shops suspending flights in and out of Zimbabwe and closing all schools as a means of fighting against the spread of COVID-19. The whole of 2021 the schools opened physically for a few months only. In 2022, Zimbabwean President Emmerson Mnangagwa indefinitely deferred the reopening of schools, citing high numbers of COVID-19 cases fuelled by the Omicron variant. Schools were set to reopen on January 10, but they delayed until February 7, and only examination classes were allowed to reopen on January 10, (Mazingaizo, 2022). According to UNICEF (2020), to reduce the extent of learning disruptions, the Ministry of Primary and Secondary Education (MOPSE) partnered with some organisations such as UNICEF to find new innovative ways of helping children learn. The primary and secondary education sector in Zimbabwe is governed by the MOPSE. The MOPSE is decentralised in 10 provinces: Bulawayo, Harare, Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Masvingo, Matabeleland North, Matabeleland South, and Midlands. These have provincial education departments that are responsible for implementing the policies of the national department, as well as dealing with local issues (Chiri, 2020)

2. LITERATURE REVIEW

The literature advocates varied views concerning the effectiveness of such assessments, and thus this paper attempts to present these diverse perspectives.The study also endeavours to synthesize and present the challenges associated with the rampant use of digital teaching-learning platforms and the opportunities it created for primary and secondary schools to leverage even post-crisis.

The emergence and rapid spread of the novel coronavirus disease has disrupted education systems in southern Africa and beyond. By mid-April 2020 it had interrupted the school, college, and university-based learning of nearly 1.58 billion students, comprising about 91.4 % of the world's enrolled learners in 192 countries (UNESCO, 2020). In Africa, 262.5 million pre-primary and secondary school children, about 21.5% of the continent's population, are out of school because of COVID-19-related school closures (Save the Children, 2020).

The pandemic has affected learners' rights to quality, safe and inclusive education and social engagement with peers and educators (INEE, 2020; UN, 2020). Discussions around online learning and the use of television and radio for revision began to occupy the corridors of the education sector in southern Africa as soon as the reality of lockdown struck. As such, several responses have been mounted by various organisations to mitigate against the loss of time because of the lockdown. In Africa, COVID-19's most consequential impacts on education have been identified as the widening of inequalities, increase in marginalisation, and the inability of the most disadvantaged learners to pursue their studies and acquire knowledge and skills that support a healthy transition to adulthood (UN, 2020; UNESCO, 2020). The most affected learners include those whose foundational learning was not strong: girls, children and youth with disabilities, and refugees, migrant, and displaced children (Save the Children, 2020). In southern Africa, digital learning challenges are more acute in rural communities with low levels of material resources, lack of internet infrastructure and information and communications technology (ICT) illiteracy (SADC & UNESCO, 2020).

3. METHODOLOGY

The study mainly used the literature review approach, including document analysis and conceptual analysis of secondary sources of data, which included several peer-reviewed journals, reports, and even newspaper articles. The study benefited from recently published journals, policy, and reports from national and international organisations on COVID-19 and digital transformation. The conceptual nature of the article presents a particular limit due to the limited nature of the data. Table 1 gives an estimated number of journal articles, reports, and news articles that helped to shape the direction of the study. Some of the journal reports and news articles listed in the table are not necessarily referenced in the paper, as they only contributed to ideas that led to the development of the paper. The number of journals, reports, and newspaper articles listed are estimates; they could be more.

Table 1. Journal articles, reports, and news articles that shaped the trajectory of the study

Journal Articles	Reports	News Articles
32	13	25

Source: Authors' Analysis.

4. RESULTS

To determine how various education sectors in southern Africa responded to the pandemic to ensure that learning continues, the researchers extracted some of the tools and strategies used. These are presented in different categories as indicated in the discussions below. The tables try to demonstrate the technologies used. These technologies were used in various platforms created by various private institutions in partnership with the governments of southern Africa to combat the effects of COVID-19 on education.

4.1. Digital Transformation in the education sector in southern Africa during the lockdown

4.1.1. Virtual learning during the lockdown

Table 2 shows the tools used by different departments of education in southern Africa to provide virtual classes during the lockdown. The different education departments made use of television and radio stations to offer virtual lessons exclusively to learners during the lockdown. As shown in the table, learners received lessons from television and radio stations.

Table 2.Virtual classes during the lockdown

Tool Used	Description	Connectivity	Platforms	Conditions of use	Target group
Television	Teachers delivering lessons live to learners on TV	Offline	Television desktop	Free	Primary and secondary learners
Radio	Teachers delivering lessons live to learners on radio	Offline	Radio/desktop/mobile phones	Free	Primary and secondary learners

Source: Authors' Analysis.

As presented in Table 2, different governments in southern Africa and various sections of its media made some provisions for virtual learning. According to UNESCO (2020a), the MOBE in Botswana confirmed the launch of educational television in mid-April, broadcasting classes through TV to assist distance learning. E-Thuto is a digital learning platform that was implemented in the north-eastern region of Botswana by the national government and the radio Lesson Programmes, educational content was broadcasted on RB1 (UNESCO, 2020a).

In a study done by Mhlanga and Moloi (2020a), the DBE in South Africa used television and radio stations to offer virtual lessons exclusively to pupils during the lockdown, especially to those who did not have access to the internet, as they did not have computers, laptops, smartphones, and other gadgets to facilitate virtual learning. This was supported by the initiative done by the SABC Education where students received lessons from SABC television and radio, DSTV, and E.tv stations. Moshekga (2020) states that the national broadcaster added two studios where the broadcast of the virtual classrooms would take place. In these studios, teachers were delivering lessons live and real-time to learners. This was done through virtual classrooms, teaching learners as they would in a physical classroom. Through E.tv, the government also allocated a dedicated channel for three months on the open view platform for learners (Moshekga, 2020).

In Zambia, the MOGE in partnership with the Zambia National Broadcasting Corporation (ZNBC) established a television (TV) channel dedicated to broadcasting both primary and secondary school lessons in all subjects. These lessons were broadcasted even after the re-opening of schools (Mukuka, Shumba & Mulenga, 2021). According to World Vision-Zambia (2020), online learning platforms and accessing lessons on television and local radio stations are currently supporting continuity of learning for children in non-examination classes that are still not able to access schools. Vulnerable learners received solar radios and SD cards with pre-recorded lessons, to ensure access to distance learning content even in areas with poor or no radio frequency coverage. This is supported by a study done by Restless Global (2021) that learners in rural Zambia like Choma where there are no radio signals were provided with small solar-powered radio with pre-recorded lessons. MOGE, Restless Development Zambia, and UNICEF-Zambia worked together to design the radio programs that would ensure continuity of learning as the COVID-19 pandemic had forced the government to close schools throughout the country, (Restless Global, 2021). According to Mwebantu (2020), the MOGE launched a television channel. The Edu TV Channel broadcasts classroom-based learning and life-skills programmes for children from primary to secondary level, based on the Zambian national curriculum. The channel was launched through the collaboration between MultiChoice Zambia, as part of its CSI initiatives; the MOGE and the ZNBC to deliver televised education to Zambian learners considering the school calendar changes due to the COVID-19 pandemic (Mwebantu, 2020).

In Zimbabwe according to UNICEF-Zimbabwe (2020), to mitigate internet challenges the MOPSE, with support from UNICEF Zimbabwe, launched the radio lessons programme. Education Cannot Wait (ECW) and Global Partnership for Education (GPE) have been supporting the development and broadcast of radio lessons. Some lessons were broadcasted on National FM, Power FM, Classic 263, Radio Zimbabwe and KhulumaniFM(UNICEF-Zimbabwe, 2020). According to the Chronicle (2020), the radio lessons have not been without challenges with some caregivers suggesting that there should be a feedback mechanism for students to ask about areas of misunderstanding. The other challenge was electricity power cuts (Chronicle, 2020). In a study done by Maphosa (2021), despite radio being the best-chosen

option, learners in some rural settings were still facing some challenges as there are no radio signals in their geographic locations. The teachers who were interviewed by Maphosa (2021) all agreed that with the present ICT infrastructure setup in Zimbabwe, radio is the best mode of delivering lessons. According to Maphosa (2021), in Zimbabwe, where there are no dedicated radio stations for educational programs, learners may miss out on re-listening for more comprehension, and repeating the programs may not be possible.These teaching modalities were not suitable for all students. For example, some learners with disabilities such as hearing and visual impairments have to depend entirely on family members to help them with home-based learning. Yet, some of these learners live with family members who do not have basic knowledge of sign language for communication with those with hearing impairments (Muchanga, De Souza, Negumbo, Temco, Chipepere, Nhnyete, Gurapo, Coetzee & Madiba, 2020).

4.2.1. Digital school and remote learning

In response to the COVID-19 disturbances, some digital schools were formulated. Table 3 indicates tools associated with the digital school.

Table 3. Tools associated with the digital school

Tools used	Description	Connectivity	Platform	Conditions of use	Target group
Internet (websites, learning applications)	Leaners learn on their own at home	Online	Desktop/ Laptop/ mobile	Free/reduced (lockdown)/ some rights reserved	Primary and secondary learners
Social media applications (Facebook, WhatsApp, Twitter)	Teachers in public and private schools offer classes through a live stream.	Online	Desktop/ Laptop/ mobile	Free/reduced (lockdown)/ some rights reserved	Primary and secondary learners
Microsoft teams	Used mainly by learners in Private schools	Online	Desktop/ Laptop/ mobile	Free/reduced (lockdown)/ some rights reserved	Primary and secondary learners
Zoom	Used mainly	Online	Desktop/	Free/reduced	Primary and

	by learners in Private schools		Laptop/ mobile	(lockdown)/ some rights reserved	secondary learners
Google meet	Used mainly by learners in Private schools	Online	Desktop/ Laptop/ mobile	Free/reduced (lockdown)/ some rights reserved	Primary and secondary learners

Source: Authors' Analysis.

In their survey Matsheng and Angrist (2020) found that a majority of households in Botswana lack computers and internet access, so reaching families at home proved difficult. According to Matsheng and Angrist (2020), there is a "low-tech" approach that provided weekly SMS messages and live phone calls from instructors for virtual over-the-phone tutoring teaching basic numeracy concepts, such as place value or subtraction. Motshabi, (2020), in her study, found out that despite the recent focus on expanding the use of Information and Communication Technology (ICT) in Botswana, the country was not ready for remote learning. The ICT infrastructure is limited and technology disparities among learners became evident based on home background and geographic location. Pedagogically, most teachers had no training or experience with remote teaching and learning.Wide-reaching access to radio and nationalised television still broadcast with analog transmission and a nationalised curriculum helped to facilitate lesson delivery.

In South Africa, according to ILO (2020), the DBE published study material including textbooks, worksheets, revision booklets, and study guides on their website. In Cape Town, organisations joined the forces to offer free online learning for school pupils during the lockdown. Organisations such as Worksheet Cloud, together with My School My Village My Planet provided funding for this program. Lessons called Worksheet Cloud Live Lessons were free and were offered to Grades 3–7. The lessons were for Mathematics, English, and Natural Science. In these lessons, students were enjoying unlimited and free access to live-streamed online classrooms every day. Parents could easily, and freely, have access to learning material for their children. Organisations such as Worksheet Cloud, together with My School My Village My Planet provided funding for this program (ILO, 2020). In another example from rural South Africa, a study done by Mukute, Francis, Burt, and De Souza (2020), some learners had to rely

on what had been learnt at school due to no internet connectivity to access teachers' emails or online resources, some teachers in rural schools were also finding it difficult to ensure coherent lessons due to being disturbed and cyberbullied by pupils who posted jokes during online lessons. In their study, Mukute et al (2020) found out that some learners who had resources lacked the motivation to attend Zoom-based lessons as they felt that teachers did not care about them at all.The government of South Africa indicated that electronic readers were available via all platforms of major cell phone networks in South Africa, i.e. Vodacom, MTN, Telkom, and Cell-C, as well as 2Enable App as a freely downloadable educational platform with more than 2000 electronic readers in the indigenous languages of the country (Moshekga, 2020; SABC Education, 2020). In addition to that, South Africa's mobile networks gave room to learners across the educational divide to access teaching materials through zero-rated educational and informational (reference) websites (Tech Financials, 2020).

In Zambia, to ensure learning during the forced school closures, MOGE designed a program for remote learning platforms. Learners with special education needs were provided with adapted tablets to access remote learning alongside their peers. UNESCO-Zambia (2020) found out that most of the teachers and other educationists were ill-prepared to use technology to reach their learners during the pandemic. The teachers settled on the use of WhatsApp and Google classroom, although the main challenges have been that some students were inaccessible. Many also did not have smartphones for online learning, (UNESCO-Zambia, 2020). The assessments done by UNESCO-Zambia (2020) revealed some of the obstacles to using ICT, including limited equipment and poor internet connectivity. Additionally, the results flagged a rural-urban divide concerning these challenges, with rural areas suffering from a more unstable electricity supply leading to poor internet connectivity. In Zambia, rural learners had the lowest rate of ICT equipment, with 38% of them not having any computers at all.

Zinyemba, Nhongo and Zinyemba (2021) did their study in Zimbabwe and found out that for most learners in non-government schools, learning continued in the face of COVID-19 as they made use of internet-based platforms like Google classroom, Zoom, Microsoft teams and Google meet. The learners reported getting access to such platforms upon payment of fees hence not all

learners from non–government schools were covered, as learning was based upon payment for the service. Some of the learners in non-government schools despite the availability of such learning platforms did not attend all their lessons due to a myriad of challenges that were beyond their control like power cuts with no backup power at home; poor internet connectivity; no connectivity at all and depletion of the paid-up bundle. The most affected learners were students that reside in rural areas as they were not attending any lessons as compared to their counterparts who were in urban areas. A study done by the ECLAC-UNESCO (2020) noted that both rural learners and educators in Zimbabwe were mostly affected by the closure of schools due to lockdown restrictions as there was no proper infrastructure and basic resources that could enable online learning. The problem has been exacerbated by the increase in data and internet charges by some mobile network operators and internet service providers, this meant that only a few learners were afforded the online classes (Matabvu, 2020.)

In their study, Zinyemba et al (2021) found out that online learning in Zimbabwe was faced with a lot of educator resistance as not much was done to ensure that the learning could be conducted in a conducive environment. The most cited challenge by the educators was footing the internet bill from their meagre salaries and making use of their gadgets to accommodate hundreds of assignments. Most of the learners and educators reported using WhatsApp and email. According to Thabela (2020) the MOPSE, with support from education partners, used digital and online learning platforms such as Ruzivo by Higher Life Foundation, and other digital platforms to ensure continuous learning during the COVID-19. UNESCO-Zimbabwe (2020) also launched Dzidzopaden/Imfundwe'ndlini a WhatsApp platform for remote teaching, and such digital platforms ensured continued learning for children in home isolation. This WhatsApp automated chatbot is aimed at distributing premium academic resources to learners who have limited or no access to the internet but have access to WhatsApp. The chatbot distributed curriculum-aligned academic resources (notes, past exam papers, and marking schemes) for Grade 7s, Form 4s, and Upper 6s(UNESCO-Zimbabwe, 2020). According to Nhongo and Tshotsho (2021), there are three methods of delivering instruction that conformed to remote teaching during the lockdown in Zimbabwe. These methods include online teaching, using the radio to deliver lessons, and the use of WhatsApp. In their study, Nhongo and Tshotsho (2020), found out that although

WhatsApp is not treated as a formal channel of education in Zimbabwe, teachers said that it is one of the most efficient modes.

5. Proposed framework on digital transformation for primary and secondary schools

Based on the challenges associated with the effective and successful implementation of the measures discussed in this paper, it seems almost impossible to reach out to all learners especially those in rural areas and other underprivileged communities. Nevertheless, the proposed framework provides suggestions on the possible solutions so that we can ensure that learning continues amidst the COVID-19 school closures and other future calamities. The proposed framework as shown in Figure 1, it has five pillars which include digital improvisions, digital access, digital awareness, digital enablers, and digital literacy which are all interlinked. The users (digital users) are also included in the framework.

Digital Improvisions

To embrace a digital transformation program, there is a need for digital improvisions to ensure education continuity in the lives of both learners and teachers. As shown in Figure 1, digital improvisions include knowledge creation to maintain effectiveness to cope with turbulent and uncertain times. Both learners and teachers should find innovative ways to strengthen and foster education for sustainable development.

Digital enablers

Different stakeholders should find ways to address the learning crisis by implementing strategies that seem challenging to implement. As illustrated in Figure 1, the government must demonstrate its commitment to embracing 21st-century learning by crafting and fully implementing national policies that support modern teaching and learning. For example, understanding ICT in education policy; curriculum and assessment; pedagogy; application of digital skills; organisation and administration; and teacher professional learning. The governments should also work with non-profits, international organisations like the United Nations Children's Fund (UNICEF), United Nations Educational, Scientific and Cultural Organisation (UNESCO) who have their goals

aligned to digital transformation and the advancement of education regardless of their geographical location. The governments need to work closely with development partners to remove technological barriers, and lower connectivity costs, as well as the need to invest in digital infrastructure and digital literacy, especially for marginalised populations. To facilitate, there is a need for Training Needs Analysis (TNA). TNA is defined by Ludwikowska (2018) as the process in which an organisation (schools) identifies the training and development needs of its employees (learners) so that they can do their job effectively (education performance). It involves a complete analysis of the training needs required at various levels of the organisation.

Digital literacy

Both learners and teachers should be taught how to use digital technologies in education. Digital learning tools should be tailormade for a particular age and geographical location. Digital literacy will mean that both learners and teachers have the skills they need to live, learn, and work to communicate and access these digital technologies like internet platforms, social media, and mobile devices.As shown in Fig 1, digital literacy includes information, data, and media literacy, Information and Communication Technologies (ICT) proficiencies, digital creation and innovation scholarship, digital identity and well-being, digital learning and development, and communication, collaboration and participation, digital safety.

Digital awareness

Both teachers and learners need to be aware of the knowledge, skills and attitudes required for them to use digital tools effectively. As shown in Figure 1 teachers and learners should be aware of the digital tools and applications (digital fluency) so that they can adapt to the changes in technology to obtain new information that can be encountered throughout life. When the teachers and learners are aware of the digital transformation, they will be competent (digital competence to use digital technology and communication tools appropriately to access, manage, combine, and evaluate information.

Digital access

As shown in Figure 1, digital access includes access to tools and technologies, such as the Internet and computers, that allow for full participation in a digital society. Teachers and learners need proper infrastructure (digital gadgets, like tablets desktops, tablets, electricity), software (technology-based human interactivity, platforms delivery media tools) and connectivity to access digital technologies.

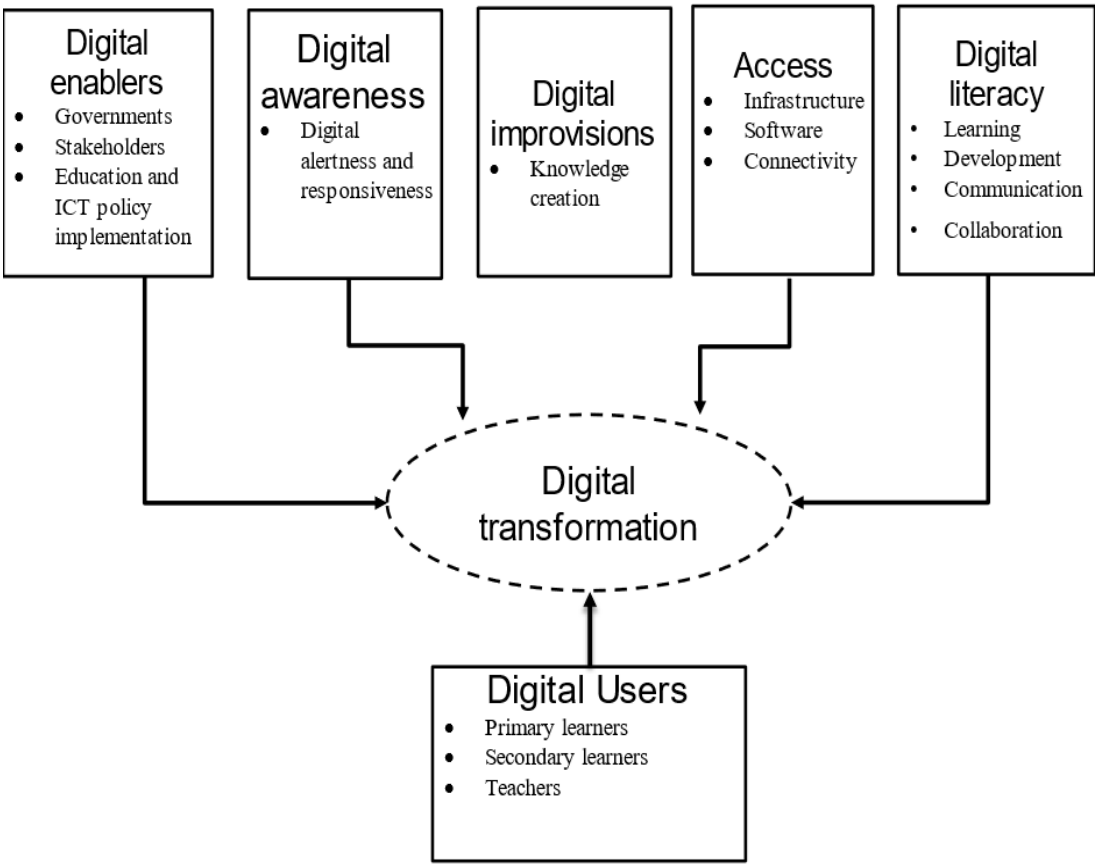


Figure 1: Framework for Digital transformation to bridge the gap between the have and have not, synthesized by the Researchers

6. CONCLUSION

In this study, secondary research was done to understand how the digital transformation was adopted to bridge the gap between the haves and the haves not in southern African primary and secondary schools in the Covid-19 era. The study was based on the reviewing of secondary data

sources; these were mainly newspaper articles, magazines, peer-reviewed journals, recently published journal articles, and policy reports from national and internationalorganizations.Based on our findings we can conclude that digital transformation can play a pivotal role in facilitating remote learning in southern African countries.Wealso, conclude that even though remote learning was the best method to give learners access to education and to enable participation, it had some specific issues and challenges, including unfamiliarity with new technology and methods of dealing with unknown challenges, for many learners and their teachers, higher drop-out rates, and lowered academic achievement level. A proposed integrated framework on digital transformation for primary and secondary schools in southern Africa which bridges the gap between the have and the have nots was crafted. The proposed framework demonstrates how having access to digital technologies and connectivity in southern Africa can help not only in responding effectively to crises but also in planning for recovery and in building the resilience of education systems.

7. RECOMMENDATIONS

Different governments in southern Africa should demonstrate its commitment to embracing 21st-century learning by crafting and fully implementing national policies that support modern teaching and learning. An in-depth analysis of the strengths and weaknesses of the technology adopted should be conducted and this could be accompanied by a cost–benefit scenario analysis of each technology adopted.

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MARKETING INFORMATION AND KNOWLEDGE SERVICES OF ELECTRONIC LEARNING CENTRES IN JOHANNESBURG PUBLIC LIBRARIES, SOUTH AFRICA

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Abstract
Marketing services maximise awareness and use of the services within an organisation. The aim of the study was to establish the marketing of information and knowledge services of Electronic Learning Centres in the City of Johannesburg (CoJ) Public Libraries. Marketing serves to satisfy user needs and wants while building strong user relationships in an effort to gain value from users in return. It identifies the different types of information and knowledge services in the CoJ, determines the strategies for awareness and use and suggests ways for enhanced marketing of information and knowledge services in the 21st century. Electronic Learning Centres are appreciated as critical learning tools in the 21st century and all the libraries which possess them to strive to optimally use their services
Using the Technology Acceptance Model (TAM) for this study, a quantitative research approach was employed and data was collected through administered questionnaires. The target population for this study was electronic learning (e-learning) librarians and e-learning users. The e-learning librarians were targeted because they ensure that the e-learning services are utilised optimally, and are providers of such services. The study also realised that users of the e-learning centres consume the services offered in the e-learning Centres, hence they were included.

The findings revealed that computers, laptops, free Wi-Fi, free internet, electronic resources were among the services accessible to the users of the CoJ Public Libraries. The Library website page, word of mouth from e-learning librarians and other users were some of the strategies to market the information and knowledge services available and accessible.This study focused on the e-learning users and e-learning librarians in the Electronic Learning Centres for the marketing of information and knowledge services and excluded other services, other categories and other profiles of the respondents within the libraries.

Marketing information and knowledge services offered in the e-learning information centres enhances such centres' optimal usage, therefore marketing is instrumental as one of the tools on the use of the centres. In this paper, suggestions are made on how to enhance the marketing of services.

Keywords: *Information and knowledge services; Electronic Learning Centres; marketing strategies; usage; City of Johannesburg, South Africa*

1. INTRODUCTION

The use of Electronic Learning Centres (e-learning centres) by users of the City of Johannesburg (CoJ) libraries in South Africa plays a huge role in remodelling learning and leisure. This includes the use of e-learning centres for the provision of public access to the internet, laptops, computers and e-learning programmes. Mobile e-learning classrooms also encourage resource sharing for the under-resourced libraries. Therefore, the e-learning is a collaborative initiative undertaken by the Library and Information Services in the Department of Community Development in the CoJ.

In recent years, marketing information and knowledge services has remained a contentious topic in the field of Library and Information Services (Prasad & Saigal, 2019; Jha, 2021). The notion of marketing information and knowledge services of public libraries comprises activities such as determining user needs, designing appropriate services to meet their needs, communication and distribution to inform and serve the users (Otobrise & Omagbon, 2019). According to Otobrise and Omagbon (2019), marketing refers to the management process which identifies, anticipates, and supplies user needs efficiently and profitably. Furthermore, the system encourages users to communicate in order to optimize the learning experience (Bhatnagar, 2016). E-learning marketing, according to Kumbhar (2009), refers to the promotion of e-learning through one or more forms of electronic media. Computers, networks, telecommunications, storage, and sharing technology are all utilised in the e-learning educational system.

Public Libraries, globally, are adopting the use of electronic learning (e-learning) in order to improve services offered to those, who are glued to technologies and need timely services. Therefore, marketing information and knowledge services to the users particularly in this day and age of technology leads to optimal usage of e-learning centres. Electronic Learning Centres in Public Libraries are enhancing services to the users by ensuring that services are available to them quickly and efficiently (Mbambo, Jiyane, & Zungu, 2022). This topic has been studied in the literature from many perspectives. For example Abbasi & Zardary (2012); Han &Yates (2016); Otobrise & Omagbon (2019), have addressed marketing of services in libraries. Otobrise and Omagbon (2019), were interested on the marketing of libraries, information and knowledge products and services in supporting electronic learning.

This includes the Electronic Learning Centres' marketing information and knowledge services for public access to the internet, tablets, computers and electronic learning programmes. Electronic Learning Centres promote resource-sharing for the under-resourced libraries. Through the shift to mobile technologies and the paradigm shift from textbooks to tablets, the marketing information and knowledge services of Electronic Learning Centres in Public Libraries have the opportunity to draw the attention to the users and create awareness to them on the information and knowledge services available for them and also provide users with open online courses, a learning venue, and effective learning content. As such, in most Public Libraries, having access to electronic learning centers has improved service delivery (Dzandza, 2019: 79; Mbambo et al., 2022). With the advent of fourth industrial revolution, new possibilities for information services have opened up, and this has revolutionised the function of the librarian from the dawn of time.

2. CONTEXTUAL SETTING AND LIMITATIONS

The study was conducted within the Public Libraries in the City of Johannesburg (CoJ) Metropolitan Municipality and these libraries are regarded as educational hubs, providing users with access to books, magazines, and audio-visual materials to help them with their studies, careers, businesses, and personal growth. The City of Johannesburg is located in the Gauteng Province of South Africa. The City of Johannesburg Metropolitan Municipality (COJMM) is located in the Gauteng province of South Africa and serves a total of 4.9 million people (StatsSA Community Survey 2016). The current population makes it the biggest metro by population size in South Africa. The City of Johannesburg Library and Information Services (COJLIS) forms part of community development under the city's Human and Social Development Cluster. COJLIS is expected to contribute programmes that address some of the cluster's mandates such illiteracy, lack of information literacy skills, increasing digital citizenry in the 4th industrial revolution by bridging the digital divide, implementing eLearning programmes (City's smart city's strategy) and inequality with regard to library service provision (Mpendulo & Ramela, 2018: 4).

The Library and Information Services is one of the directorates of the Community Development Department in the City of Johannesburg (CoJ) which oversees and manages 90 Public Libraries

and three support sections responsible for delivering library services to its 4.9 million residents. It important to note that, it was only in the 1970s that the Johannesburg Public Library opened their doors to black users (Issak, 2000; Mhlongo, 2018: 24).

In the 2006/07 financial year, the CoJ restructured into seven regions, namely: Region A-G, including the Johannesburg City Library, which became part of Region F to ensure equitable levels of access to public library services and resources in compliance with the minimum norms and standards for Public Libraries in the CoJ (Johannesburg City Library, 2012).
There are seven regions with a total of 90 libraries servicing the City of Johannesburg's communities. In the 12 regional libraries, there are 12 e-learning classrooms, which are computer labs that provide training for all age groups. There are two to three Champions per region and also at the City Library (total of 24) who are responsible for 'championing' e-learning to their region's library staff. There are number of e-learning programmes rolled out vary from region to region and library to library, depending on the needs of the community and the available resources.

The study was restricted to City of Johannesburg Libraries (Electronic Learning Centres). The reason for choosing the libraries Electronic Learning Centres in the municipality was due to accessibility, time constrains and costs involved when conducting the study. Other libraries like academic, special and mobile libraries did not form part of the study because they did not open for all members of the society like Public Libraries.The study also excluded users who were not using the library for e-learning services such as those who used the library for other purposes. The study reports part of the findings from the bigger Master's project conducted in the COJMM.

3. PROBLEM STATEMENT

Patrons find it difficult to use and profit from Electronic Learning Centres at Public Libraries if they are unaware of their existence. The use of Electronic Learning Centres benefits not only e-learning public library users, but it also allows the public library Electronic Learning Centres to fulfil its purpose and prove return on investment of investing in these resources as an

organisation (Moyo, 2017: 2). Electronic Learning Centres in Public Libraries, according to Abbasi and Zardary (2012), could provide both digitised services and electronic resources over the Internet to assist e-learning. In CoJ more users than ever before have turned to Public Libraries for space, access to materials, and access to internet resources, especially with the introduction of technology and the onset of the COVID-19 epidemic (Mbambo et al., 2022).

As a result, librarians must design a variety of marketing strategies to promote their services so that many users can benefit from the extensive services provided by the Electronic Learning Centres in Public Libraries. To this end, this study seeks to find solution to the challenge by delving into the world of digital information and communication technology, in order to make these services available and accessible to users. Thus, this study will not only raise library users' awareness of the e-learning services offered by Public Libraries in the COJMM, but will also provide a platform for all public libraries to increase their overall value in the society through marketing.

4. AIM AND OBJECTIVES OF THE STUDY

The aim of the study was to investigate the marketing of information and knowledge services of Electronic Learning Centres in the 21st century in the City of Johannesburg Public Libraries, South Africa, using the following objectives:

- To identify different types of information and knowledge services in electronic learning centres of the CoJ Public Libraries.
- To determine the strategies for awareness and use in the Electronic Learning Centres of the CoJ Public Libraries.
- To suggest ways to enhance the marketing of information and knowledge services in Electronic Learning Centres.

5. THEORETICAL FRAMEWORK

This section presents the theoretical support underpinning this study on marketing information and knowledge services of Electronic Learning Centres in the 21st century.

The Technology Acceptance Model (TAM) was used to determine the marketing, awareness, and use of Electronic Learning Centres by library users in Johannesburg. Ocholla and Le Roux (2011: 61) describe a theoretical framework as, “The structure that holds and supports the theory of a research work,". A theoretical framework is generally built on one overarching theory, (Ngulube 2018: 1). Davis modified theory of reasoned action (TRA) in 1986 to develop the Technology Acceptance Model (TAM). As a result, users' decisions to adopt and use technologies for e-learning are influenced by two main aspects. Perceived usefulness and perceived ease of use are two of these factors (Davis, 1989: 319).

According to Abayomi (2017: 19), Perceived Usefulness (PU) is the point a person believes that using a specific system would enrich his or her job performance” (Davis, 1989: 320).Therefore, when users of the e-learning centres are aware of the services, the uptake on the use of services is increased. Perceived Ease of Use (PEOU) is the point a person believes that using a specific system would be free of effort (Davis, 1989: 320). Users of CoJ e-learning centres would realise this notion only when the information and knowledge services are marketed and they are aware of them and become interested to find out how the system could help them use it with less effort. Also, they would believe that the system is worth using as the librarians would not market services of e-learning centres if they were not of benefit to them. TAM is extensively used to underpin studies on acceptance and use of technologies for e-learning and has developed as a predominant model of choice.

6. LITERATURE REVIEW

This section presents the review of literature on marketing information and knowledge services of Electronic Learning Centres.

The literature was organised according to themes of the questions, broader issues around the research phenomenon and theoretical framework that underpins the study. Topics covered are; types of information and knowledge services in CoJ Electronic Learning Centres; strategies for awareness and use of information and knowledge services in the Electronic Learning Centres;

and ways to enhance marketing of information and knowledge services in Electronic Learning Centres.

6.1. Types of information and knowledge services in the CoJ Electronic Learning Centres

The value of e-learning centres in libraries, according to Mbambo et al., (2022), is defined not only by the amount and breadth of their contents, but also by how their e-learning services are consumed. These information and knowledge services are designed to allow users (from Africa and around the world) to enroll in electronic learning courses. On the same note Abumandour (2020: 178), observes that Public Libraries aspire to be a place of interaction, learning, tolerance, and understanding . The Electronic Learning Centres offer a wide range of services to its users. Some literature has identified information and knowledge services provided by electronic learning centers in Public Libraries are as follows:

Free computers, Internet access and free Wi-Fi

Users can access internet and Wi-Fi through their Electronic Learning Centres computers (Opeyemi 2018: 134). Public Libraries have improved their information and knowledge services through electronic learning. The rapid growth of the internet and the web has altered information generation, storage, and retrieval methods (Mbambo et al., 2022), as well as increasing demand for Electronic Learning Centres among library users. This is regardless of users' geographical location and time constraints within the country, have been surmounted.

Electronic resources: open and closed access

Library users can access online resources such as e-books, online newspapers, and articles from the electronic resources collection that are subscribed to by Public Libraries (Moyo, 2017: 18). Desktop computers and various mobile devices such as mobile phones, palmtops, laptops, notebooks, i-pads, and other miniature devices can be used to access electronic resources remotely. Electronic Learning Centres at Public Libraries, according to Mbambo et al., (2022), can host a mobile electronic resource library, bringing education to one of the most remote parts of the world where knowledge is needed.

Printing and copying centres

In the electronic learning centers, patrons can type, print, and copy their work. The main objective of this service is to allow users of Electronic Learning Centres in Public Libraries (from all over Africa and the world) to access the services offered by these Electronic Learning Centres (Abumandour, 2020: 190).

Specialized courses for librarians and users

Library staff undergo techno-literacy training in order to provide them with all of the required abilities to assist users (Mpendulo & Ramela, 2018: 7). The City of Johannesburg libraries has electronic learning programmes such as Siyafunda, Goethe M-Literacy, Microsoft, IBM, Vodacom, FunDza Literacy Trust, and Google SA are imparted to library professionals (Mpendulo, 2017). Librarians impart these skills to users when they need assistance. Furthermore, the programmes available introduce users to the concept of self-learning and encourage them to pursue personal development through information literacy.

6.2. Strategies for awareness and use of Electronic Learning Centres

According to Maya, (2018: 94) it is difficult to overestimate the importance of awareness and use of Electronic Learning Centres in the lives of library users. In order for information and knowledge services to be utilized optimally, users of the e-learning services should have full awareness. Users must be aware of numerous elements such as typing, printing, photocopying, and scanning in electronic centres in order to gain information and knowledge of usage (Moyo, 2017: 2). The intention of the study points out the role of public libraries in spreading and supporting the Electronic Learning Centres in Africa. Despite its importance in today's socio-cultural learning theories, the importance of social awareness in electronic learning has only recently been discussed from different perspective in the published literature (Abumandour, 2020: 179; Abbasi & Zardary, 2012; Han & Yates, 2016; Kumbhar, 2009).

Effective Electronic Learning Centres, according to Mbambo et al., (2022), should consider not just information and knowledge transfer, but also social and dialogical interactions among users. As a result, the design of such environments influences the kind of social interactions that might occur, and thus can enhance or inhibit learning.

Strategies to create awareness of information and knowledge services in e-learning centres could include the following tools such as, Moodle, Zoom, Google Classroom, YouTube, and many countries introduced new systems and websites in collaboration with Microsoft IBM, Vodacom, World Bank such as Educ.ar, and Eduthek (The World Bank, 2020). The strategies enhance awareness among users on the effectiveness of Electronic Learning Centres. Furthermore, awareness of information and knowledge services in e-learning centres quality has a straight consequence on user's loyalty such as user friendliness of e-learning centres and website, Secondly, Quality of Librarian Instructor, thirdly, Administrative and Supportive Service Quality in details (Pham, Limbu, Bui, Nguyen, & Pham, 2019).

6.3. Ways to enhance marketing of information and knowledge services of Electronic Learning Centres

According to Otobrise and Omagbon (2019), the primary purpose of library marketing is to fulfil the library's mission, meet the needs of users, attract new and current users, highlight distinctive programmes, and market the use of library of information and knowledge services of Electronic Learning Centres.

Libraries should have a well-defined strategy for marketing information and knowledge services to their patrons. Public Libraries can use digital media tools, such as Overdrive (e-books), e-journals, e-theses and dissertations, Pressreader (e-magazines, e-newspapers), e-research reports, e-bibliographic databases, E-Britannica, and conference proceedings, to market their information and knowledge services (City of Johannesburg case study 2018/19). Overdrive has electronic books that caters for children, youth, and adults. It has non-fiction and fiction books. While, Pressreader has electronic newspapers such as Mail & Guardian, Business news; with e-research reports, e-bibliographic databases, and E-Britannica users are able to access articles, dissertations and journal reports electronically from these databases (Mhlongo 2018:24).

To improve the marketing of Electronic Learning Centres' information and knowledge services, computing, digital, and technical, strategies to create awareness may be linked to strategic planning of public libraries (Moyo, 2017: 30; Dzandza, 2019: 49). The plan may be integrated to

the Library and Information Services, Electronic Learning Centres, the vision of the Electronic Learning Centres may be created and translated into a mission statement that can be used to measure short, medium and long term goals (Nenungwi & Garaba 2022). The strategies create awareness to increase digital citizenry in the 4th industrial revolution and redress inequality with regard to library service provision by bridging the digital divide and implementing eLearning programmes (the city's smart city's strategy) (Mpendulo & Ramela 2018:4).

7. RESEARCH METHODOLOGY

This study employed a positivist paradigm, employing a quantitative research approach to obtain primary data from respondents through questionnaires. The target population were the users of the Electronic Learning Centres, as well as librarians. The probability sampling technique was adopted to select 24 librarians and 60 users from the COJ Public Libraries Electronic Learning Centres. These libraries include Ivory Park Library; Diepsloot Library; Cosmo City Library; Emndeni North: Emndeni Library; Jabavu Library; Sandton Library; Alexandra 8th Ave Library; CBD: Johannesburg City Library; Westbury Library; Eldorado Park Ext 5 Library; Orange Farm Library; Poortjie. The libraries are denoted as regional libraries of Johannesburg due to their size and resources. The users were selected because they use the Electronic Learning Centres for a variety of reasons, including job advancement, personal development, and online or offline studying. It was vital to include 24 librarians working in the area of the Electronic Learning Centres since they are in charge of monitoring and ensuring that the Electronic Learning Centres are available, accessible, secure, dependable, and authentic to use. The 60 users were all selected through stratified sampling from the entire public library user population due to their homogeneous strata of electronic centres use. According to Creswell and Creswell (2018), stratified sampling ensures that diverse groups of the population are adequately represented in the sample. That is used when the sample accurately reflects the genuine percentage of people with specified characteristics in the population (Etikan & Bala, 2017). Due to users' homogeneous strata of use of electronic centres from the full public library users and librarians, it was used to obtain a representative of a good sample.

The study consists of sixty (60) e-learning library users and twenty-four (24) e-learning librarians from 12 regional libraries. Probability sampling technique was adopted to select 24 librarians and 60 users from the Electronic Learning Centres. A total of 84 questionnaires were distributed to 60 e-learning library users and 24 librarians, of which all eighty-four (84) questionnaires were returned, resulting in a 100% response rate. An online (Google form) self-administered closed-ended questionnaire was sent to participants' email addresses. Quantitative data collected were analysed using the descriptive analysis where the Statistical Packages for Social Sciences (SPSS) was used, resulting in the use of bar charts, pie charts, tables, frequencies, and percentages.

8. FINDINGS

8.1 Types of information and knowledge services in the CoJ Electronic Learning Centres.

In order to identify types of information and knowledge services, the respondents were asked the following question

Which information and knowledge services are offered in the CoJ Electronic Learning Centres?

Multiple of responses were provided on types of information and knowledge services offered in Electronic Learning Centres as provided in Figure 1.

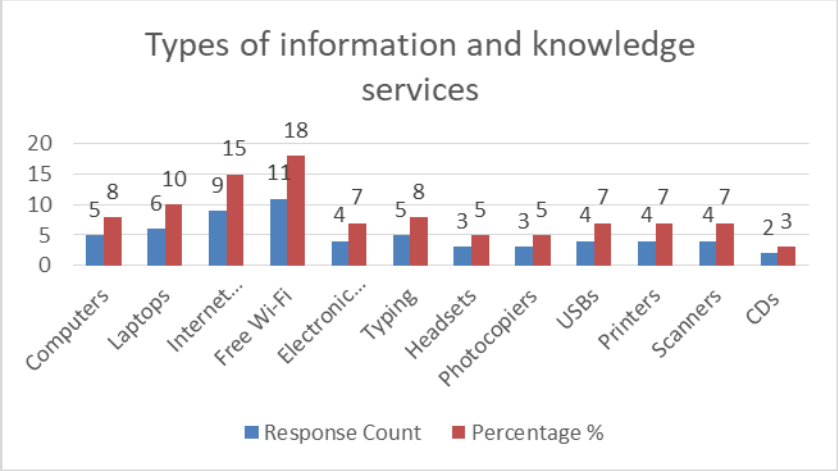


Figure 1: Types of information and knowledge services (N=60)

It was interesting to note that only three (5%) access electronic learning services for headsets and 2 (3%) for CDs. The findings indicate that most of the users made use of the information and knowledge electronic learning services centres because of Wi-Fi, Internet access and laptops

services. These findings are in line with Mbambo et al., (2022); and Abumandour (2020: 184), who noted that there are numerous benefits of information and knowledge services in Electronic Learning Centres not available in other institutions.

The users' responses are in par with those from the librarians who have articulated they use them for internet and printing; for Wi-Fi and electronic resources; to assist users to meet their needs; for training users on coding, writing and cloud-based learning. Perceived Usefulness (PU) is the point a person believes that using a specific system would improve their performance (Davis, 1989: 320). Perceived ease of use (PEOU) is the point a person believes that using a specific system would be effortless" (Davis, 1989: 320).

The respondents make use of information and knowledge services in Electronic Learning Centres to maximise their potential performance, as they easy to use.

8.2 Awareness and use of Electronic Learning Centres by the users of the CoJ Libraries

To know the marketing strategies used for marketing the information and knowledge services, the e-learning users and librarians were asked the following question:

What awareness strategies are used for marketing the information and knowledge services?

It was important that the respondents share what is used as ways of creating awareness to them on the electronic learning centres. This question sought to establish if awareness increase usage in any means. The respondents became aware of the information and knowledge services in the e-learning centres in COJ Libraries as presented in Table 1 below.

Table 1: Awareness of Electronic Learning Centres (N=60)

Answer Options	Response Count	Percentage %
Personal Discovery	15	25
From Friends	12	20
From Library Staff	20	33
Other e-learning centres users	3	5
User Orientation	2	3
Direct Mailing To Users	1	2
Through The Electronic Library Webpage	2	3
Electronic Mail	1	2
Library Social Media Tools (e.g.	4	7

Facebook, Twitter, etc.)		

It is evident from the findings that most users of the e-learning information centres at the COJ public libraries became aware of the electronic learning services centres library staff. A significant number also personally discovered these, while a few learnt from friends, the library social media tools, and other Electronic Learning Centres users. However, the library social media tool and other electronic platforms indicated a very low response. This is in line with Otobrise and Omagbon (2019), whose study revealed that most librarians in Public Libraries do not engage in awareness of library information and knowledge services.

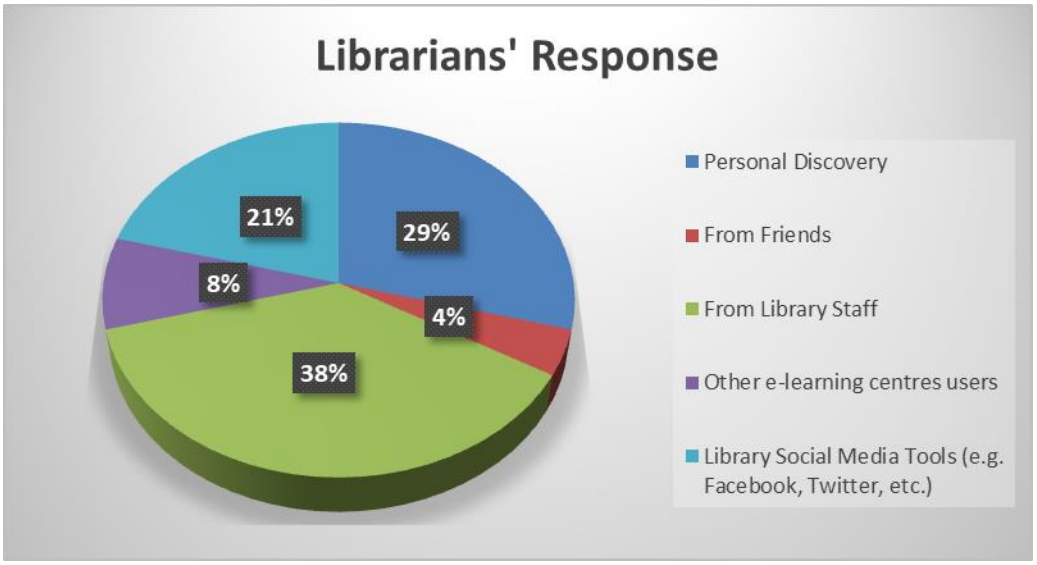


Figure 2: Librarians' awareness of Electronic Learning Centres (N=24)

The response from librarians regarding the strategies for awareness and use of Electronic Learning Centres are par those of users, as they concur that users became aware through the library staff; personal discovery; through library social media tools; from friends; and other electronic learning services. According Moyo (2017: 144), majority of remote users are not aware of the e-learning centres in their libraries. This implies that over the years there has been no significant improvement on remote users' strategies for awareness and use of Electronic Learning Centres in COJ Libraries.

8.3 Ways for enhanced marketing of information and knowledge services in Electronic Learning Centres.

In order to determine the marketing of information and knowledge services in Electronic Learning Centres, the following questions were asked:

What ways for marketing of information and knowledge services in Electronic Learning Centres are used?

The following responses were provided on marketing of information and knowledge services in Electronic Learning Centres as provided in Figure 2.

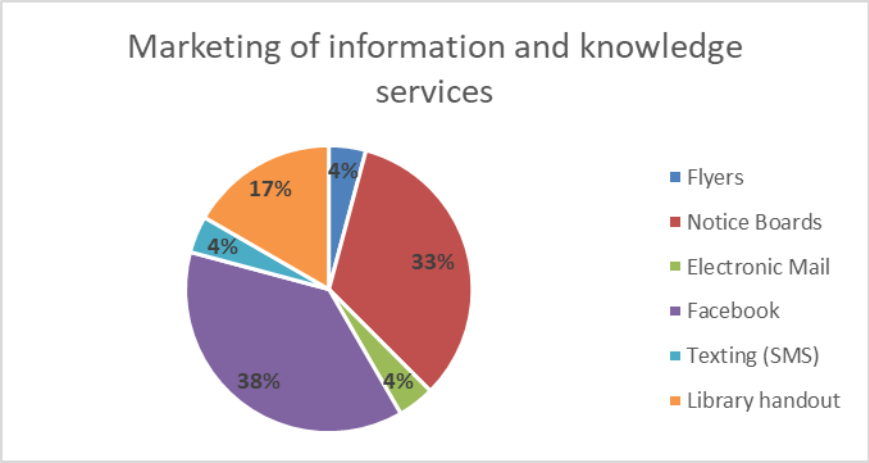


Figure 3: Marketing of information and knowledge e-learning services

The findings indicate that Facebook and Notice Board were the most marketing information and knowledge services used in Electronic Learning Centres. Therefore, the marketing of information and knowledge services is very low. Marketing of library information and knowledge services is poorly carried out in public libraries. In fact, majority of the Public Libraries do not market their products and services digitally (Otobrise & Omagbon, 2019).

The response to the enhancement of marketing of information and knowledge services in e-learning centres included the following:

Marketing supported by technology

The librarians specified other platforms for marketing information and knowledge services as WhatsApp; google Allo; Advertisements (Ads); delicious, LinkedIn; and Pinterest. While, the users' responses are not different from those of librarians, they included Twitter, Youtube, and Tik Tok. It is therefore important to explore other platforms for marketing information and knowledge services of Electronic Learning Centres, were a user' portal platform may be integrated into the library webpage (cojelearning.org.za). This is in line with Jha (2021), were library marketing can be done on website. Mutual benefits can be obtained by a user and a librarian as well with the use of an effective webpage.

Use of boards and other non-digital ways

Apart from digital marketing, Mbambo et al., (2022), states that more marketing on information and knowledge services of Electronic Learning Centres, regular noticeboards updates, flyers, and direct marketing of Electronic Learning Centres is equal as Important as marketing information and knowledge services on the online and websites to bridge the digital divide gap in public libraries. Moreover, advocacy on information and knowledge services of Electronic Learning Centres is required as COVID-19 has derailed the progress of digital transformation.

Library marketing is one of the important subsets of how libraries happen to outreach to patrons, according to Prasad and Saigal (2019). In a globalised world with information as one of the main assets being considered in the scheme of things and knowledge, library marketing is one of the important subsets of the way libraries happen to outreach to patrons (Kumar & Singh, 2015).

9. CONCLUSIONS AND RECOMMENDATIONS

Quite a number of information and knowledge services are offered by Electronic Learning Centres of the COJ public libraries. They include computers, laptops, electronic resources, stable internet access and free Wi-Fi. The study recommends that Public Libraries that have Electronic Learning Centres should:

- Acquire more government funds to purchase more computers, laptops, electronic resources, sustainable free Wi-Fi and free internet for information and knowledge services.

- Librarians should embark on digital marketing of information and knowledge services of Electronic Learning Centres to maximise awareness and optimal utilisation by users.
- To strengthen the country's economy, the CoJ Libraries should compel CoJ network providers to provide standard and efficient services so that more internet marketing strategies can be conducted across all COJ public libraries with e-learning information centres.
- Librarians in the Electronic Learning Centres of information and knowledge services should make provision of time to ensure they interact with users as a significant number indicated their preference to interact with the librarians.
- Develop and implement effective awareness programmes known to users for diverse user needs in all centres.
- It is further recommended that collaboration between Department of Art & Culture and e-learning unit for funding, training programmes such Overdrive (e-books) and Pressreader (e-magazines, e-newspapers).
- The strategies to create awareness should be linked to strategic planning of CoJ public libraries to improve the marketing of Electronic Learning Centres' information and knowledge services.
- Advocacy on ways for enhanced marketing of information and knowledge services in Electronic Learning Centres is required to bridge the digital divide gap in public libraries.

Moreover, the strategies for marketing, awareness and use of Electronic Learning Centres information and knowledge services may act as a potential method of establishing a relationship with patrons, if used accordingly. It was clear from the findings that users of information and knowledge services found in the e-learning information centres value these services and therefore marketing of such should be viewed as an important component of public libraries e-learning information centres. The vision of the Electronic Learning Centres should be created and translated into a mission statement for effective marketing information and knowledge services in the e-learning centres in CoJ Libraries (Nenungwi & Garaba 2022). E-learning librarians should advocate (through WhatsApp; google Allo; Advertisements (Ads); delicious, LinkedIn; and Pinterest) and focus more on digital marketing of public libraries, information, and knowledge services, as this would attract more users to Public Libraries Electronic Learning

Centres and reach out to a wider range of users. This will enhance marketing of information and knowledge services in Electronic Learning Centres.

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UNDERGRADUATE STUDENTS' PERCEPTION ON EMERGENCY REMOTE TEACHING DURING COVID-19

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Abstract
This study reports preliminary findings on undergraduate students' perception of the Emergency Remote Teaching (ERT) at the University of Ibadan, Nigeria, during Covid-19. Proportional to size sampling was used in obtaining the sample size of 366, while respondents were selected using convenience sampling. Data collection was through a structured questionnaire and data was collected on the factors - attitude, affect, motivation; perceived behavioural control (accessibility, self-efficacy, ease of use,); and cognitive engagement. Findings showed that students' positive attitude towards face-to-face learning was significantly higher than towards ERT and correlation analysis showed a relationship between preference for face-to-face learning struggling with ERT. Also, at $t_{332}=1.517$, $p>0.05$, *the average difference in students' motivation for learning before and after commencement of ERT was not statistically significant. Students reported more frequent use of educational technologies after ERT than before and the difference was statistically significant* ($t_{349}= -15.439$, $p<0.05$). *Increase was reported in all the self-efficacy skills and accessibility to educational technology tools was reportedly most of the time although not always. Findings also showed an increase in all cognitive engagement constructs. Positive changes reported were mainly acquisition of additional hobbies as well as business, social and technology skills. Challenges to online learning included poor power supply, cost of data subscription, network disruptions and distractions from family and friends.*

Keywords: *Emergency remote teaching, undergraduate students, attitude, affect, motivation, perceived behavioural control, cognitive engagement*

INTRODUCTION AND LITERATURE REVIEW

COVID-19 has affected many aspects of human lives and in many countries, citizens had to cope with lockdowns restricting virtually all forms of person-to-person contact. In addition to this, organizations also struggled to maintain their activities during the pandemic. The pandemic clearly transformed the way people interacted and carried out their activities particularly in education (Bari, Chopade, Kachwa, Navandar, & Dhamaniya, 2021). Globally, the pandemic

disrupted the educational system as many schools were forced to shut down including primary, secondary and tertiary institutions. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) (2020a), the closure of educational institutions affected more than 90% of students worldwide. For example, in Nigeria, the Federal Government ordered the closure of educational institutions at all levels in March 23, 2020. In most of the African countries, academic sessions were halted and students were forced to leave their various schools and campuses in order to reduce the spread of COVID-19 virus in educational institutions. This sudden disruption was a shock to many institutions who were not prepared for the far-reaching effect of the pandemic. UNESCO took step to limit the disruption caused to the educational system by endorsing the use of educational platforms and applications that support online learning through which teachers were able to reach their students remotely (UNESCO, 2020b). Moreover, most universities all over the world, including the developing countries of Africa were also forced to adopt emergency remote teaching and learning (Johnson, Veletsianos, & Seaman, 2020; Oyediran, Omoare, Owoyemi, Adejobi, & Fasasi, 2020).

The abrupt conversion of face-to-face teaching to temporary online delivery due to the pandemic has been called “emergency remote teaching” or “emergency remote learning” (Shisley, 2020). This suggests an unplanned temporary online method of teaching students from a distance which arose due to the inability of teachers and learners to be physically together in the classroom. It contrasts the traditional distance education or online teaching which involves careful planning over a relatively long period of time (Hodges, Moore, Lockee, Trust, & Bond, 2020; Shin & Hickey, 2021, Shisley, 2020). Irrespective of this difference, ERT is conducted using technology tools as used in the traditional online delivery and it requires an internet access too. Such technology tools and platforms include Google Meet, Zoom, Microsoft Teams, Blackboard, Edmodo, Udemy, among others (Onyema et al., 2020). A major difference between traditional distance learning and ERT is that while the former is usually voluntary, ERT is usually not optional, it is the only choice especially in the face of a pandemic as being experienced during Covid 19. The implication of this is that both teachers and students have no choice than to adopt this method of teaching and learning.

Nigeria's premier university, the University of Ibadan, also began remote teaching of its students in February 2021 after the strike by the nation's Academic Staff Union of Universities was called off. The institution immediately put in place a University of Ibadan Emergency Remote Teaching (UI-ERT) committee to facilitate successful engagement of students and lecturers in online teaching and learning for its 2020/2021 academic session. The committee ensured that all lecturers and undergraduate students were registered with the University's Learning Management System. However, considering that coordinated measures may not be readily put in place especially in sudden transitions in response to a crisis, individual lecturers were also allowed to decide on additional different technology tools to support their teaching and these included Zoom, Google Meet, Microsoft Teams, Google Classroom, E-mail, WhatsApp, pre-recorded videos, among others. The first semester was conducted exclusively online using both asynchronous and synchronous learning modes. However, in the second semester, the hybrid approach was adopted. While online delivery was continued for very large classes, some classes with few students were held physically. After a session of the ERT, there is a need to investigate the perception of students on the effectiveness of the shift to ERT and the effect of this on their learning process. Such findings will not only add to the growing literature on ERT during the pandemic, but in view of the fact that the change to online teaching was sudden and the University did not have adequate time to properly design course contents to fit the online mode, students' assessment of the effectiveness of the ERT and its effect on their learning process can provide more useful insight to the University in preparation for future emergencies.

THEORETICAL PERSPECTIVE

Users' degree of acceptance is crucial in understanding the effectiveness of online learning (del Barrio-García, Arquero, & Romero-Frías, 2015) and factors associated with this have continued to be of interest in studies on use of technology for learning. The Technology Acceptance Model (TAM) by Davis (1989) and Venkatesh, Morris, Davis and Davis (2003) UTAUT model have been widely used in education to evaluate the use and acceptance of educational technologies (Granić, & Marangunić, 2019). Moreover, other models have been developed by different researchers from these existing models and this has led to great differences in the constructs used in assessing technology use and acceptance. In order to take care of this variability and reduce

measurement bias, Kemp, Palmer and Strelan (2019) analysed the two foundation models along with contemporary research, grouped constructs with similar characteristics, and included constructs relevant to educational technology to form a flexible taxonomy suited to educational technology.

The taxonomy by Kemp et al (2019) contains seven primary taxonomy groups of factors related to both students and lecturers' use of educational technologies and these were: attitude, affect, and motivation; instructional attributes; perceived behavioral control; social factors; system attributes; cognitive engagement; and usefulness and visibility. This study however used only attitude, affect, and motivation; cognitive engagement and perceived behavioral control. The two factors: usefulness and visibility; and system attributes, are not very relevant to a study of this focus since the ERT was not planned and many users, students and lecturers were only forced to use available technologies and learn while using them. The pandemic also has greatly affected social interactions and many students who suddenly found themselves learning under ERT were not prepared for social interactions and many lecturers were also not sure of how to promote this. Hence, this study investigated factors associated with students' perception of the effect of ERT on their learning process and these factors are: attitude, affect, and motivation; cognitive engagement and perceived behavioral control (Aguilera-Hermida, 2020).

Attitude, affect, and motivation were grouped as related variables by Kemp et al. (2019). Attitude is an individual's positive or negative assessment of using the educational technology. In this study, attitude was measured based on students' preference for online teaching or face-to-face teaching. User satisfaction is an affectual state. Hence, affect in this current study is the extent to which students are pleased with their use of the ERT. Student satisfaction is a reflection of how they view their learning experience and it is an important element in assessing quality of online delivery (Alqurashi, 2019). Motivation is however focused on a student's intrinsic drive to learn and achieve set goals. Highly motivated students will engage in learning activities that are goal-oriented and are committed to continuing these activities (Cebi & Guyer, 2020; Kemp et al., 2019). Moreover, students who are motivated show an improvement in their individual class participation, engagement levels and academic achievements (Cebi & Guyer, 2020).

Perceived behavioural control is an individual's ability, effort, as well as facilitating conditions which can affect use of educational technologies (Aguilera-Hermida, 2020). It consists of four tertiary groups in Kemp et al.'s taxonomy and these are: self-efficacy, ease of use, facilitating conditions and opportunity (accessibility). In the context of this study, facilitating conditions was not included, as online teaching was sudden and there was no significant opportunity to train students in the use of the various platforms employed for teaching. Ease of use is the extent to which students expect educational technologies to be used effortlessly, and in the context of this study, this involves prior and continuous use (Yueh, Huang, & Chang, 2015). Ease of use is closely related to self-efficacy (Kemp et al., 2019) which refers to students' judgement of how they use their skills to perform necessary tasks. It is not an assessment of their actual skills (Bandura, 1982) and it is different from computer self-efficacy which is an individual's judgement of their skill in using a computer (Teo, 2009). Accessibility however, is the frequency of access a student has to educational technology and ability to use such unrestricted (Aguilera-Hermida, 2020).

Cognitive engagement refers to a student's willingness to invest and exert effort in learning by integration of cognitive processes that facilitate knowledge absorption (Blumenfeld, Kempler, & Krajcik, 2004; Kemp et al., 2019). It is self-regulatory and involves setting goals and taking actions focused on achieving these goals. Cognitive engagement increases as learners actively participate in learning activities which can include creating new ideas, knowledge generation and enthusiastic interaction with other online learners (Yehya, 2020).

This study investigates the perception of University of Ibadan students on the effect of the ERT on their learning process by providing answers to the following questions.

1. What is the perception of students regarding attitude, affect and motivation factors during their ERT experience?
2. What is the perception of students regarding perceived behavioural control (ease of use, accessibility and self-efficacy) factors during their ERT experience?
3. What is the students' assessment of their cognitive engagement during the ERT?

4. What challenges did the students face in the course of their online learning?
5. What are the positive changes experienced by the students during the period?

METHODOLOGY

This study is exploratory and adopts the cross-sectional descriptive design. It was carried out among undergraduate students of Nigeria's premier university, University of Ibadan. The University was ranked first in Nigeria in Webometrics July 2021 rankings (https://www.webometrics.info/en/africa/nigeria) and by the country's National Universities Commission (The Guardian, December 13., 2021). The study population included all undergraduate students of the university. A sample size of 394 was gotten from the population of 24,452 based on Yamane (1973) formula. Proportional-to-size sampling was used in arriving at the target sample size in each of the sixteen faculties. Majority of the participants were from the faculties of Education, Science and Arts (Table 1). Participants in each faculty were however reached through convenience sampling. By the second semester, students were available generally on campus as ERT continued along with physical classes in some courses. The university also accommodated some students in the halls of residence, while strictly following government rules on educational activities during the pandemic. Hence, copies of the instrument were physically administered to the students while observing the rule of social distancing and wearing of mask. Data collection was carried out towards the end of the second semester and lasted two months.

Measurement of constructs, instrumentation, data collection and analysis

A structured questionnaire by Aguilera-Hermida (2020) was adopted for this study. The author developed the instrument based on Kemp et al. (2019) taxonomy related to use of educational technologies. Request for the instrument was sought through email and the author obliged its use and made the instrument available. The questionnaire included close-ended questions and few open-ended questions which gathered qualitative data. Few sections in the instrument were however not included for this study because they were not considered relevant to the research questions for the current study. The instrument had 5 sections as outlined below:

Section A: contained questions on demographic information and this included age, gender, faculty, number of courses and respondents' household structure.

Section B: had questions on Attitude, Affect and Motivation. Attitude of respondents towards ERT was based on their preference for online teaching or face-to-face learning, while data on the affectual state of the respondents was based on their satisfaction with their courses. Both constructs were measured based on a 3-point scale (ranging from 1 = Disagree, 2 = Neither agree or disagree and 3 = Agree). On a 4-point response scale (1 = not motivating, 2 = slightly motivating, 3= motivating, 4= very motivating), students also rated how the following factors motivated them for learning before Covid 19 and after the ERT commenced: interaction with lecturers, talking to classmates, school activities, hanging out (studying, talking, eating, etc.), interest in class topics, complete schoolwork, and finishing degree/program.

Section C elicited data on Perceived Behavioural Control (Accessibility, Self-efficacy and Ease of use). Data on *Ease of use* was collected based on respondents' prior use of the educational technology before Covid 19 and use after ERT commenced. On a 5-point response scale (5 = very frequently, 4 = frequently (once per week), 3 = occasionally (1 to 2 times per month), 2 = rarely, and 1 = Never), participants rated their use of the following: communication tools (Zoom, Teams, Google); online educational platforms (Canvas, Classroom, Blackboard, etc.); social media (LinkedIn, Instagram, TikTok, Facebook, Twitter, etc.); synchronous class sessions (live) and asynchronous videos (sent by lecturers). *Self-efficacy* question collected data on the respondents' assessment of how their skills have changed since the commencement of ERT. Students assessed this change on a 5-point response scale (5 = much better, 4 = some-what better, 3 = about the same, 2 = somewhat worse, and 1 = much worse) based on six scholastic abilities which included 'complete assignments on time', 'new learning tools', 'discussion of topics with classmates and lecturers', 'manage group projects', 'Time management skills'. Questions on *Accessibility* collected data on extent of respondents' access to reliable digital device and internet service, Communication platforms (such as Google Classroom, Microsoft Teams, Zoom, etc) and technical support. These items were each rated on a five-point scale (5 = always, 4 = most of the time, 3 = sometimes, 2 = never and 1 = I don't need it for my learning).

Section D elicited data on *Cognitive engagement* and respondents were asked to compare their school performance now with how they were before ERT using a 5-point response scale (5 = much better, 4 = some-what better, 3 = about the same, 2 = somewhat worse, and 1 = much worse). Cognitive engagement was measured using five items namely 'knowledge/learning, concentration, class attendance, level of engagement, interest and enthusiasm.

Section E had two qualitative questions. The first question asked respondents about ERT related challenges that have affected their learning experience, while the second question elicited data on the positive aspects or changes they have experienced during the period.

The total of 394 copies of the questionnaire were administered to students across the sixteen faculties. However, 376 copies were retrieved showing a 92.6% return rate, out of which 10 were unusable as they were only filled half-way. Hence, the total of 366 copies were used for this study (Table 1). Data analysis was carried out using SPSS for the quantitative data collected. Descriptives as well as Pearson correlation, One sample and Paired sample t-tests were used in the analyses. Qualitative data were analysed thematically and some representative responses were included in the text.

Table 1: Breakdown of population, sample size and retrieved instrument

S/N	Faculty	Population	Sample size	Retrieved and usable
1.	Agriculture	2,141	35	34
2	Arts	3,269	53	52
3	Basic Medical Sciences	1,034	17	17
4	Clinical Sciences	1,532	25	8
5	Dentistry	213	3	2
6	Education	4,183	67	67
7	Law	1,062	17	11
8	Pharmacy	516	8	8
9	Public Health	820	13	13
10	Science	3,555	57	57
11	Social Sciences	1,874	30	30
12	Technology	2,290	37	37
13	Veterinary Medicine	623	10	10
14	Renewable Natural Resources	655	11	11
15	Environmental Design & Management	126	2	0
16	Economics	559	9	9
	Total	24,452	394	366

RESULTS

Demographic description of respondents

The total of 366 respondents participated in the study. Majority were females (57.4%) and most of these respondents were in the age categories of 16 – 20 years (47.5%) and 21 to 24 years (40.7%). Not surprising, most of the respondents were single (98.1%). The average number of courses taken during the session was 9.

Attitude, affect and motivation

Attitude – In order to understand the attitude of the respondents towards the University's ERT, students were asked about their preference for online delivery or face-to-face learning. Table 2 presents result of the descriptive statistics.

Table 2: Students' perception on the factors - Descriptive statistics

Item	N	Mean	SD
Attitude – Face to face	360	2.69	0.570
Attitude – ERT	357	1.83	0.763
Struggle with ERT	359	2.19	0.718
Affect (satisfaction with courses)	359	2.31	0.715
Motivation before	349	2.88	0.635
Motivation after	344	2.83	0.718
Use of ICT before	355	3.14	1.115
Use of ICT after	357	4.22	0.783
Self-efficacy	348	3.94	0.792
Accessibility	352	2.99	0.671
Cognitive engagement	360	3.87	0.935

As shown in Table 1, the students' preference for face-to-face learning (Mean=2.69) was stronger than remote teaching (Mean=1.83) and this shows a more positive attitude towards face-to-face learning. Moreover, the low standard deviation (SD) of 0.570 shows that majority of the data points are very close to the mean of 2.69. A Paired sample t-test was carried out to test if the means in the two groups were significantly different (Table 3).

Table 3: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Face-to-face - ERT	.863	1.104	.058	.748	.978	14.759	356	.000

Table 3 shows a significant average difference between students who preferred face-to-face teaching and those that preferred ERT (t_{356}=14.759, $p<0.05$). On an average, students who preferred face-to-face teaching were 0.863 times higher than those that preferred ERT.

Pearson correlation was used to test the relationship between preference for face-to-face and struggle with ERT. As shown in Table 4, at r=0.400, $p<0.05$, there was a moderate but significant positive relationship between both variables. Even though the mean score is 2.19 which is almost neutral for *struggle with ERT,* the correlation result shows that to some extent, students who had preference for face-to-face teaching struggled with ERT.

Table 4: Correlation

		Struggled with adapting to ERT
Prefer face-to-face	Pearson Correlation	0.400
	Sig. (2-tailed)	0.000
	N	359

Table 2 also reveals *Affect* with a mean of 2.31, showing that students were neutral in their assessment of satisfaction with their courses during this period. *Motivation* for learning before and after the ERT commenced were compared using the seven factors as stated in the methodology section. The internal consistency of the responses for motivation before the pandemic was 0.822 while that of motivation after ERT commenced was 0.861 (Cronbach's alpha). Both values were considered acceptable. The mean score as seen in Table 2 shows a decline in students' motivation for learning during the ERT. However, a Paired sample t-test was

carried out to determine if the difference observed in the mean score for the two groups was statistically significantly (Table 5).

Table 5: Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Motivation before-Motivation after	.05405	.65034	.03564	-.01605	.12416	1.517	332	.130

As seen in Table 5, the average difference between the students' motivation before and after the ERT commenced is not statistically significant (t_{332}=1.517, p>0.05). This means that students' motivation to learn remained constant despite the introduction of ERT.

Perceived behavioural control (Ease of Use, Self-efficacy, Accessibility)

Ease of use implies previous experience or continuous use of educational technologies. The degree of use of this technology is a measure of perceived ease of use by the students. Participants reported the frequency of use for the five educational technology platforms and activities before the Covid-19 pandemic and use after the ERT commenced. Good internal consistency was observed in the "before" (Cronbach's alpha =0.83) and "after" (Cronbach's alpha =0.79) items. The mean score for the before and after items was calculated. As seen in Table 2, the frequency of use of educational technology after the commencement of ERT (Mean = 4.22) was higher than before Covid 19 (Mean = 3.14). However, a Paired sample t-test was carried out to test if the means in the two groups were significantly different (Table 6).

Table 6: Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			

Pair 1	Use before - Use after	-1.06914	1.29558	.06925	-1.20535	-.93294	-15.439	349	.000

Table 6 shows that the average difference between the students' frequency of ICT use before and after the ERT commenced is statistically significant (t_{349}= -15.439, $p<0.05$). On an average, students who used ICT before the commencement of ERT were 1.069 less than those who used it after ERT commenced.

For *self-efficacy*, students were asked to assess how their skills in six activities had changed since the ERT began. The mean score of 3.94 (Table 2) shows that the students' self-efficacy increased after the ERT commenced. Moreover, using 3 (about the same) as the test value, One-sample *t* -test was carried out to see the students' self-efficacy in each of the six activities. As shown in Table 7, the positive mean difference in each activity is statistically significant, showing that the students reported an increase in their ability to carry out all the six skills.

Table 7: One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Ability to complete assignments on time	13.557	362	.000	.799	.68	.91
Knowledge of new learning tools (analyzing/creating videos, online quizzes, etc)	26.528	361	.000	1.193	1.10	1.28
Ability to be successful in classes	19.348	361	.000	.978	.88	1.08
Ability to manage group projects	19.540	358	.000	.955	.86	1.05
Discussion of topics with classmates and lecturers	16.429	364	.000	.879	.77	.98
Time management skills	14.742	365	.000	.844	.73	.96

Accessibility is the students' perception of the consistency of access to educational technology tools and services. Although data was collected based on a 5-point response scale, the last option, 'I don't need it for learning' was chosen by 12 participants. Ten of these were selected in

response to the option of technical support and one response to the option of a reliable internet service. Hence, this scale was removed and analysis was carried out on a 4-point response scale which was 4 = always, 3 = most of the time, 2 = sometimes and 1 = never. Mean accessibility score of 2.99 (Table 2) shows that the students had access to these technologies most of the time but not always and this was observed generally in each of the four accessibility categories.

Cognitive engagement

Cognitive engagement refers to a student's extensive integration of cognitive processes in order to facilitate knowledge absorption (Blumenfeld et al., 2004). At Cronbach's alpha value of 0.91, the five school related constructs showed good internal consistency in their responses. A mean score of 3.87 (Table 2) shows that generally, the students accessed their cognitive engagement during the ERT as somewhat better. One-sample t-test was used to compare the mean response for each of the cognitive engagement constructs based on the test value of 3 (about the same). Table 8 shows that students reported increase in all the five categories and at $p<0.05$, this increase is considered statistically significant.

Table 8: One-Sample Test

	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Knowledge/Learning (school related)	20.924	364	.000	1.110	1.01	1.21
Class attendance	13.860	363	.000	.830	.71	.95
Level of engagement	14.772	364	.000	.852	.74	.97
Concentration	15.131	363	.000	.821	.71	.93
Interest and enthusiasm	12.803	361	.000	.760	.64	.88

Challenges faced during ERT

The challenges reported by the students can be classified into situational (power supply, cost of data and network disruptions), online issues (distractions from fellow students and inability to hold meaningful class tutorials) and emotional challenges (Aguilera-Hermida, 2020).

Situational challenges: Irregular power supply was a major challenge faced by the students during the ERT. Often times their devices' batteries run down and they miss out on some classes. Added to this is the cost of data subscription and network disruptions which led to some being thrown out of online classes. Some of the responses by the students are shown below:

> *The issues of data and network really affected my learning, power supply was another factor that really affected learning during the ERT* (Female, 16-20 years, Faculty of Education)
>
> *Lack of mobile data and sometimes the phone will be dead and I won't be able to attend the online class* (Female, 21 – 24 years Faculty of Arts)
>
> *The poor network affected classes and sometimes I missed classes even tests* (Male, 21 – 24 years, Faculty of Social Sciences)

Online issues: Many students reported their inability to collaborate with their colleagues and hold group discussions, while others complained about their inability to really ask questions during classes because class periods were reduced, as well as distractions from colleagues during classes.

> *We were unable to organize group discussions due to the rule of social distancing* (Male, 21 – 24 years, Faculty of Economics)
> *The online classes were not that benefiting, Network failure, explanation was short due to conscious data usage* (Female, 25 – 29 years, Faculty of Education)
> *I was not able to ask questions well and some students were unprofessional during Zoom meetings* (Male,16 – 20 years, Faculty of Science)

Few students also mentioned distractions from family and friends during their online classes.

> *Different distractions from notifications and calls from friends and family* (Male, 21-24 years, Faculty of Arts)
> *Distractions at home due to chores and family interruption at class sessions* (Male, 21-24 years, Faculty of Agriculture)

Emotional challenges: Some of the students reported that their inability to see their lecturers face-to-face affected them and made studying at home boring. Expressions made by students which reflected their emotional state included "I was very lazy and I just lost focus", "I have slight depression", "It affected my mental health", "Staying at home a lot really affected my mind and I was very sad", "Learning online is difficult and somewhat weird". Disconnection from extra-curricular activities also caused frustration for some students.

Positive experiences

Thematic analysis of the qualitative data shows a dominant theme from majority of the responses and this was *ability to learn new things.* For example, some students wrote, "I saw the entrepreneurial side of me", "I acquired more social skills". Many other students reported that the fact that learning took place online gave them the opportunity to acquire new hobbies, new business, social and technology skills as shown by some responses below:

> *I was able to learn how to use some social media platforms and I was also able to take some online courses.* (Male, 16 – 20 years, Faculty of Agriculture).
> *The stay-at-home order made me take up new hobbies and also pursue extra-curricular activities* (Female, 21 – 24 years, Faculty of Technology).
> *Ability to think out of the box and learn new things outside my discipline* (Male, 16 – 20 years, Faculty of Education).
> *It gave me more time to do and focus on other things apart from my education* (Female, 16 – 20 years, Faculty of Arts).

DISCUSSION AND CONCLUSION

The paper has presented preliminary findings on undergraduate students' perception of the effect of ERT on their learning process. The total of 366 respondents participated in the study and most of them were females and majority were between 16 – 24 years of age. Findings showed that students had a preference for face-to-face learning than ERT and this agrees with previous similar studies that have investigated students' preference during this pandemic (Aguilera-Hermida, 2020; Mali, & Lim, 2021). Perhaps this might be due to the moderate correlation observed between preference for face-to-face and students' struggle with ERT which likely suggests that those who preferred face-to-face struggled with ERT. However, this might also not be unconnected with the abrupt shift to ERT which most students were not prepared for.

A key finding in this study is that there was no significant difference in students' motivation for learning before the pandemic and after the ERT commenced. This is quite a deviation from results from previous studies that have reported lack of motivation by students arising from the deployment of ERT during the pandemic (Aguilera-Hermida, 2020; Code, Ralph, & Forde, 2020; Shin & Hickey, 2021). A plausible reason for this deviation is that just prior to the lockdown, the country's Academic Staff Union of Universities had embarked on a nationwide strike which paralysed academic activities in all public universities for nine months. Hence, as soon as the

strike ended and ERT commenced, many students were eager to finish or further their programmes.

Challenges experienced which were dominated by poor internet network, high cost of data and poor electricity supply were in line with previous findings reported by Egielewa, Idogho, Iyalomhe and Cirella (2022). The institution in the current study tried to provide some data for students' use but this was grossly inadequate and many students could not benefit from the initiative. Inability to hold group discussions with fellow students was also expressed by many of the students. This finding is however not supported by findings from Muthuprasad, Aiswarya, Aditya and Jha (2021), where students found it more convenient to collaborate during online classes in the pandemic than they would in the traditional classroom setting. The reason for the finding in this current study might not be unassociated with the high cost of data access for most students. Hence, holding group discussions with colleagues might be at an extra cost for them. These findings raise the need for the institution to aggressively forge a more reliable public-private partnership with telecommunication companies, the institution's alumni and others that may be able to offer some assistance in reducing the burden of data subscription for students. It is undeniable that the cost of data subscription might be unaffordable to many of these students most of whom have an average of nine courses in a session. Moreover, the Covid-19 experience has revealed the need for all educational institutions to recognise online teaching as a priority and make adequate preparation in the face of a future pandemic.

The key finding from this study is that despite the challenges faced by students during ERT, a large percentage benefitted from this approach to learning during the period. More students were exposed to the use of educational technologies and their self-efficacy and cognitive engagement increased. A large percentage of students also used the opportunity to learn new skills. Data for this study was collected at the end of a full session of adoption of ERT, and the experiences of students have been reported to offer insights to the institution's lecturers and management. However, a follow-up study is necessary to investigate the perspectives of the lecturers in other to have a broader view of the effectiveness of ERT in the institution. Moreover, there is a limitation of the generalisability of this study. Although proportional-to-size sampling was used

in determining the sample size for each faculty, respondents were reached through convenience sampling.

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FRAMEWORK FOR INFORMATION PROVISION TO ENHANCE TEACHING AND LEARNING IN RURAL SCHOOLS DURING COVID 19 PANDEMIC

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Abstract

This study intends to investigate a framework for information provision to enhance teaching and learning in rural schools in Limpopo Province, South Africa during Covid 19 pandemic. This qualitative study used the Delphi Technique to collect data from education experts in rural primary and secondary schools in Limpopo Province. Three rounds of interviews were conducted with three experts. The participants were labelled Expert A, B and C to protect their identity and abiding by the ethical principles. The study revealed insufficient access to educational information due to lack of school libraries in rural schools. Poor access to internet was also found to be a disturbing factor as teachers need to contact learners who do not go to school daily. This study proposes a framework for information provision to enhance teaching and learning in rural schools. The study recommends that school libraries be established in rural schools. It also recommends that Department of Education provide technological resources to schools so that teaching and learning is not compromised regardless of covid 19 restrictions.

Keywords: *Covid 19, Information provision, Limpopo Province, Schools, Rural areas, South Africa*

INTRODUCTION AND BACKGROUND TO THE STUDY

Covid-19 pandemic has brought changes in the way schools operate. This has impacted negatively on schools' attendance around the globe as learners were advised not to attend schools daily to ensure social distancing in schools. Krishnakumar & Rana (2020) indicates that in the time of COVID-19, the traditional approach to teaching is no longer permissible, and there is a need to invent new ways of teaching, such as online learning. Unfortunately, traditional teaching is the approach that marginalised rural schools have adapted due to lack of resources. As such, provision of information in marginalised rural schools is a necessity. Mojapelo (2018) indicated that the lack of school libraries in rural schools in the Limpopo Province translates to lack of access to information sources in rural schools. Information sources are the sources that are used to satisfy an information need, nor the channels used in disseminating information among people

(Mohammed 2019). For primary and secondary learners, educational information is one of kinds of information they need on a daily basis to complete their schoolwork.

According to Dube (2020) online learning is seen as a tool to address trajectories during the times of crisis for teaching and learning by members of deprived communities, such as those from rural schools. COVID-19 and the implementation of online learning has magnified the challenges faced by rural learners and teachers. Due to the lack of school libraries and access to information in rural schools, Dube (2020) indicates that rural teachers and learners are deprived of useful information, education and skills. With access to information being one of constitutional rights in South Africa, it is of paramount importance for primary and high school learners to always have access to information. Mag, Sinfield and Burns (2017) are also of the view that inclusive education is a child's right, not a privilege, and, as such, any approach to teaching and learning during COVID19 must be premised on respect for human rights, which ensures that all the needs of learners are catered for by the teaching and learning process. Therefore, access to educational information is a necessity to fill the attendance gap in schools.

In South Africa, Mojapelo (2018: 415) asserts that well-stocked and functional school libraries are indispensable for teachers and learners to also advance and realise the goals of National Development Plan (NDP)). The availability of school libraries in rural schools would help with provision and access to educational information in primary and secondary schools. Only 8% of public schools in South Africa have functional libraries. These are almost entirely situated in former model C schools which have the resources to stock and staff these facilities. Approximately 20,000 schools are without libraries, thereby denying their learners access to regular reading opportunities.

This study was informed by the Critical Emancipatory Research and sought to suggest a framework for information service provision in rural schools to enhance teaching and learning. Three education experts in primary and secondary schools served as main target population for this study as the educational advocates.

CONTEXTUAL SETTING

This study was conducted in Limpopo Province of South Africa. The Limpopo province in South Africa is the northern most "province in the country, lying within the great curve of the Limpopo River, from which the province derives its name" (Maluleka 2017:7).



The Limpopo Department of Education has a head office in Polokwane, the heart of Limpopo Province. There are ten (10) district offices and 134 Circuit offices. There are approximately 4015 public ordinary schools, accommodating over 1 400 000 learners. Mojapelo (2018) indicates that there are few schools with school libraries in rural areas.

PROBLEM STATEMENT

Teaching and learning had to be stopped for some time in schools due to the outbreak of Corona Virus in March 2020. It was later suggested that learners go back to school on a rotational basis to ensure social distancing in schools. This required efforts from rural schools to ensure that despite rotational attendance in schools, learners still learnt from home. However, as stated by Tiruneh (2020), there were no efforts by the public schools in urban and rural areas to keep their

students learning from home. Despite most of the public-school teachers and parents having limited or no access to the internet, teachers still lack the preparedness to work in such unprecedented circumstances of Covid 19 pandemic (Ngogi, 2020). Besides, even if teachers, administrators, and parents worked hard to keep learning alive, these efforts were not likely to provide the quality of education that is delivered in the classroom (Dorn, Hancock, Sarakatsannis and Viruleg (2020). Unfortunately, the migration from face to face to online teaching and learning resulted in disadvantaging rural schools. As such a framework for information provision that will help to enhance teaching and learning in rural schools is needed, hence this study.

PURPOSE AND OBJECTIVES OF STUDY

This study sought to develop a framework for information provision to enhance teaching and learning in rural schools in Limpopo Province, South Africa during Covid 19 pandemic. The rationale was to suggest possible ways in which teaching and learning can take place despite the Covid- 19 restrictions. As such, the specific objectives of this study were to:

- Determine methods taken to enhance teaching and learning during Covid-19 pandemic
- Determine accessibility of educational information for rural schools during Covid-19 pandemic
- Determine challenges encountered in teaching and learning during Covid-19 pandemic

RESEARCH QUESTIONS

Research questions for this paper were derived from the study's research objectives. This study sought to answer the following questions:

- Which methods are taken to enhance teaching and learning in rural schools during covid 19 pandemic? Please elaborate.
- Howe accessible is educational information in rural schools during covid 19?
- What are the challenges encountered in teaching and learning during covid 19? Please elaborate.

METHODOLOGY

The researcher employed the qualitative research approach and used the Delphi Technique method. Three experts in the rural primary and secondary schools of Limpopo Province served

as participants in this study. Three rounds of interviews were conducted as per the requirements of a Delphi Technique study. The Delphi technique belongs to a set of qualitative research methods that rely on the judgement of individuals presumed to be experts in the subject under consideration (Ritchie, Burns & Palmer 2005: 85). Education experts served as the target population as the ones who teach learners in schools and they can detect when information available in the school is sufficient or not.

THEORETICAL LENS

This study was guided by the Critical Emancipatory Research (CER). Held (1983) asserted that the CER was formulated by Adorno, Habernas and the Franfrut School in 1924. Mahlomaholo (2009:225-226) describes the CER as follows:

> CER sees the researched as other human being(s), as equal subjects like the researcher. It sees the researcher as being tasked with the role of interpreting other people's interpretations and trying to make sense thereof. Research is seen as the most humanising experience and one from which the researcher must emerge more human, more humane, more cautious, more respecting and more open-minded to signals and messages coming from a very diverse list of sources. Good CER is empowering, changing people's lives and station in life, liberating them from not-so-useful practices and thoughts and meeting the needs of a real-life situation; it is useful and also methodologically consistent.

The choice of CER was informed by the fact that Covid-19 directly or indirectly affects everybody around the globe. As such, finding solutions to the challenges posed by the corona virus should be everybody's responsibility. Covid- 19 restrictions affects teaching and learning despite the location. Teaching and learning should continue despite the Covid 19 restrictions. The researcher, through the CER framework intends to suggest a framework for information provision to enhance teaching and learning. The CER theory was relevant for this study as it enables marginalised people, such as rural teachers, learners to unleash their human power and potential and transform their otherwise transient situation (Mahlomaholo, 2013). The transient situation for this study is caused by the Covid 19 restrictions which at some point led to closure of schools.

LITERATURE REVIEW

Literature for this paper was reviewed in accordance with the objectives of this study.

Methods to enhance teaching and learning during covid 19

Teachers are resolute to the use of social media to share information with learners. Parents were advised to organise smart phones so that teachers share school activities through whatsapp. However, in rural areas where there is no internet and electricity, the existing government intervention is not functioning to the majority rural students. As such, Mbatha (2016) opines that provision of data is expected to address the lived realties of people, such as that of online access to information. Huang, Liu, Tlili, Yang and Wang (2020) reports on several challenges during the application of online learning in the global wide which are:

- "Internet connection can be unreliable if there are thousands of learners learning simultaneously.
- Some instructors can find it difficult to find online resources that are the most suitable in their teaching contexts because thousands of resources are published online.
- Several instructors and learners do not have the appropriate digital skills to teach and learn online. This can make the online teaching/learning experience inconvenient for them.
- Several learners lack crucial learning competencies, such as adaptation, independent study, and self-regulation, which are key factors for successful online learning.
- Several instructors simply use direct instructions without considering important features of online learning, such as interactivity, social presence, and cognitive presence, resulting in unmotivating learning experiences".

To address these challenges, (World Bank 2020b) suggested the distribution of printed materials to students to study at home. In South Africa, rural areas mostly lack the social and economic viability needed to sustain technological improvement (Cristobal-Fransi, Montegut-Salla, Ferrer-Rosell, & Daries, 2020).

Access to educational information in rural schools during covid 19

Information resource provision for all schools has been neglected by the post-apartheid government. Lack of school libraries is more visible in rural areas. This affects learners' performance as most rural schools lack textbooks. Lonsdale (2003) is of the view that well-resourced and well-staffed libraries can improve and boost learner performance in schools. With

most South African schools lacking well-equipped and functional school libraries, persistent low performance of South African learners in local and international tests is a testimony to their low literacy levels (Mojapelo 2018). Governments find it more difficult to supply quality education services in rural areas, and various factors weaken the quality of learning and teaching in South Africa's rural areas (Du Plessis & Mestry, 2019). The unavailability or lack of school libraries in rural schools hampers access to educational information in schools.

Challenges in teaching and learning during covid 19

Ebrahim, Ahmed, Gozzer, Schlagenhauf and Memish (2020) argue that the state of lockdown halted learning in South African schools, and learners and educators in rural areas are helpless on approaching online learning during the COVID-19 lockdown. Online teaching and learning had to take place despite lack of resources in rural areas such as internet connectivity. In his study, Ngogi (2020) finds blended learning practised in South African Schools commendable but suggested that rural schools would be disadvantaged because of several challenges. These challenges are motivated by unemployment levels in rural areas which results in lack of funds to purchase data bundles. The issue of internet connectivity also poses serious challenge. Learners from disadvantaged background also lack smart phones that they can use to interact with other learners and teachers on schools WhatsApp groups.

Mojapelo (2018) indicates that with high poverty levels particularly in historically disadvantaged and marginalised rural communities, economic challenges are the order of the day. The author further asserts that the apartheid system in South Africa calculatedly privileged whites at the expense of the other racial groupings (blacks, coloureds, and Indians) (Mojapelo 2018). The schooling system is still characterised by rampant and massive disparities and inadequate resource provision which impacts negatively on teaching and learning accomplishments in schools. With Covid 19 restrictions in place, situation worsened as blended learning was the solution to the continuation of teaching and learning. Higher learner enrolments in rural primary schools also motivated the migration from face-to-face teaching and learning to blended learning.

Ebrahim, Ahmed, Gozzer, Schlagenhauf and Memish (2020) argue that the state of lockdown halted the economic services and products of the Global South, including South Africa. To this end, rural learners and teachers are seemingly helpless on how to approach online learning during the COVID-19 lockdown, and, therefore, the chasm between the haves and the have nots gets ever deeper while COVID-19 has made online learning inevitable, and online learning is a practicable alternative to traditional schooling, there is need for an inclusive approach that caters for the lived realities of rural learners.

FINDINGS AND DISCUSSIONS

This section looks at the findings and discussion for this study. With Delphi Technique, it is important that participants remain anonymous. But their achievements and contribution in their field of expertise are recorded. Participants for this study were labelled Participants A, B and C. The participants details are as follows:

Participant A Is a Head of Department (HOD) in one of the primary schools around Limpopo Province. He has been attached to the Department of Basic Education for the past Seventeen (17) years. He holds an Honors degree in management from one of universities in South Africa. He is also in possession of advanced certificate for foundation phase in childhood development. Participant A is one of South African Democratic Teacher's Union (SADTU) site stewards.

Participant B Is a teacher in one of the primary schools in Limpopo Province. She worked as a secondary school teacher for a period of twelve (12) years and later joined a primary school when the subject she was teaching was no longer offered in the school. She is now on her thirteenth 13^{th} year with the current employer. She holds a Bachelor of Arts Honors Degree in Management and advanced certificate for foundation phase in childhood development. She has served as the Deputy Secretary of SADTU, and she is currently a portfolio convener for education under SADTU.

Participant C Is a teacher in one of secondary schools in Limpopo Province. He has been attached to Department of Education for the past nine (9) years and specializes in Mathematics. He is in possession of BSC Computer Science Degree obtained from University of Limpopo. Participant C also has Post Graduate Certificate in Education (PGCE) from University of South Africa (UNISA). He is a SADTU site steward.

Findings on methods taken to enhance for teaching and learning during covid 19 pandemic

Participants were asked to elaborate on the methods they are taking to enhance teaching and learning during Covid- 19. Experts were in agreement that teaching and learning had to pause for some time until they were given a go ahead to start teaching on a rotational basis. Participant C who is mathematics teacher lamented that "He had to provide extra lessons were to learners in order to cover the syllabus. Mathematics requires that learners practice daily and with the help of their facilitator. As such, extra lessons were conducted in the morning and in the afternoon. Sometimes even on Saturdays".

For primary school learners, teachers had to keep on repeating what they taught learners so that they do not forget. In his response, Participant A asserted that: "It was important that before we start with a day lesson, we first check if learners still remember what they were taught previous classes. This to some extent delayed the progress as this was done with every group of learners*."*

Dube (2020) argues that while acknowledging the progress the country has made, not enough attention has been given to rural education, which necessitates redress. Some learners in cities are already using online learning and, all learners will write the same examination at the end of the year.

Findings on access to educational information for rural schools during covid 19 pandemic

Experts were asked to comment on access to education information in rural schools. The experts indicated that there is completely no access to educational information in schools except that

which they provide when teaching in classes. This affects performance of many students as they rely entirely on what they are taught in class. Experts indicated that they realised that when learners are supposed to write essays, they struggle due to lack of information for them to expand their knowledge. Participant C added that: "We once asked that we get TV for the school so that learners can watch it during break and when educational information is being broadcast. Unfortunately, the request was never honored".

Another challenge with inaccessibility of access to information is that learners cannot read and this is realised when they are asked to do oral tasks. This has been evident in South Africa. According to the National Reading Coalition (2016):

> The 2016 Progress in International Reading Literacy Study (PIRLS) tested Grade 4 and Grade 5 reading in approximately 50 participating countries, including South Africa. PIRLS tested Grade 5 learners in isiZulu, English and Afrikaans and found that 49% of children could not read at the lowest benchmark of below 400 out of a possible 1000 points, while this did rise to 78% when Grade 4 children were tested in their home languages. The results also indicated that learners in South African rural public schools performed worse than their urban counterparts in languages. Overall, the performance of South African learners in this international benchmarking assessment remained at the bottom of the study rankings.

Mojapelo (2018), posited that in order to enhance and boost the performance of the learners, well-resourced and well-staffed school libraries are a pre-requisite since they can contribute positively towards the realisation and attainment of the Millennium Development Goals (MDGs) in various countries worldwide as stipulated by the United Nations. Fombad and Jiyane (2015: 191) affirm that: 'The library and information sector is well placed to contribute towards the realisation of the MDGs, as libraries provide a support structure for education, economic development and poverty eradication'.

Findings on challenges encountered in teaching and learning during covid 19 pandemic

The three experts were asked to elaborate on the challenges they encounter in schools due toCovid- 19 restrictions.

The experts were in agreement that learners tend to forget what they were taught as they spent time at home and were not studying. Parents also were not that helpful when it comes to their children education as some would come to school without having completed their homework. For secondary learners, teachers would share information on WhatsApp. However, the main challenge is using WhatsApp for communication lies with lack of smart phones for some of the learners. In some instances even those learners who had phones, data was a challenge. This was a very disadvantageous situation impacts upon the matric pass rate in Limpopo Province. Lack of educational resources contributes entirely to the low pass rate. Other schools located in provinces such as Gauteng Province were given tablets but it was never the case with Limpopo learners. The inequality that is still exercised even under the democratic government is compromising learners' education in rural schools. The unavailability of school libraries also posed a serious threat as rotational attendance was motivated by lack of space in schools to cater for many learners at once.

Participant A added that:

> "*there is a room specifically reserved for library, with few reading materials that are not even organised. We need the government to help with the establishment of school libraries in rural schools. This would help with the improvement of children' vocabulary and reading capabilities. But if there was a library in school, learners would make use of the library when others attend classes*".

Participant B observed that: "the longest closure of public libraries in Limpopo Province also affected the learners' performance. Despite the radius, some of our learners would walk to libraries after school to complete their assignments. But this was never the case in Limpopo Province as libraries closed for longer than expected".

The IFLA/UNESCO School Library Guidelines Draft (2015: 7) states that:

> The goal of all school libraries is to develop information literate students who are responsible and ethical participants in society. Information literate students are competent self-directed learners who are aware of their information needs and actively engage in the world of ideas. They display confidence in their ability to solve problems and know how to locate relevant and reliable information. They can manage technology tools to access information and to communicate what they have learned. They can operate comfortably in situations where there are multiple answers or no answers. They hold high standards for their work and create quality products. Information literate students are flexible, able to adapt to change, and able to function both individually and in groups.

This means there should be access to school libraries in rural areas so that learners are not deprived access to educational information within school premises.

CONCLUSIONS AND RECOMMENDATIONS

Access to information is human right. With Covid-19 restrictions in place, schools were required to close down at some point. When schools re-opened, learners were not attending school daily to allow social distancing in school premises. With shortage of school libraries in rural schools, as well as public libraries in rural settings, provision and access to information in rural schools was compromised. Matric pass rate in Limpopo Province also dropped. In order to address these challenges, the study recommends that:

- The Department of Basic Education considers building school libraries for information provision and access in rural schools. The school libraries should be equipped with relevant materails necessary to support teaching and learning. It is also recommended that the proposed school libraries to be build should be managed by professional teacher librarians so that they are not turned mere store rooms.
- Department of Arts and Culture in Limpopo Province should explore the possibility of utilizing the Library Conditional Grant to build public libraries to help provide information to learners after schools.
- Department of Education to provide learners and teachers with phones and SMSs so that teachers are able to send information to learners through SMSs and learners ask questions should the need clarity through SMS.
- Government provides tablets and access to internet to all learners in rural schools to ensure that teachers provide online tutorials when learners are not in school.
- Book clubs in rural areas be established and maintained.
- Radio stations should consider broadcasting educational information as many households in rural areas have radios.

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PART FIVE

KNOWLEDGE MANAGEMENT

KNOWLEDGE MANAGEMENT PRACTICES AND SERVICE DELIVERY AMONG PSYCHIATRY NURSES AT INGUTSHENI CENTRAL HOSPITAL

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Abstract

The study sought to investigate how knowledge is managed and used among psychiatry nurses to deliver services at Ingutsheni Central Hospital. The objectives of the study were to investigate the type of knowledge that is generated, acquired, used and stored by psychiatry nurses; determine knowledge sharing/transfer strategies and use at the psychiatry department; and to assess mechanisms and infrastructure for knowledge management that were available at the hospital. The other objective was to establish the effect of organisational culture and structure on knowledge management at the Psychiatry Department and examine the effect of knowledge management practices on health care service delivery and patient care at Ingutsheni Central Hospital Psychiatry Department. The study was guided by the interpretivism paradigm in a case study research design and used both quantitative and qualitative methodology to gather data. The study population consisted of registered psychiatry nurses at Ingutsheni Central hospital. Purposive and convenient sampling were used to select the research participants. A sample size of thirty-six (36) respondents was targeted, and twenty-seven (27) respondents participated in the research. Quantitative data was analysed using Excel while Qualitative data was analysed and presented thematically. The findings revealed that there are different mechanisms and infrastructure used for knowledge management such as workshops, social interactions, training, mentorships and community of practices. In these platforms knowledge about handling aggressive patients; patient biography; medical history and reporting drug adverse of side effects among others are generated, acquired, shared and stored to facilitate effective and efficient service delivery and patient care. The study concluded that KM practice has a positive effect on health care services and patient care by improving patient safety performance in the hospital, have well-informed patient care decisions, no room for medical errors among others. It was also concluded that KM mechanisms and infrastructure, organisational structure and culture has a positive influence in KM practices which can significantly enhance service delivery and patient care. The study recommended that the hospital and the psychiatry department should implement a KM policy that guides KM practices among psychiatry nurses, adoption of modern ICT infrastructure and establishment a flexible and friendly organisational structure and culture to facilitate knowledge management among psychiatry nurses.

Keywords: *Knowledge management, knowledge mechanisms, psychiatry nurses, Ingutsheni Central Hospital.*

1. INTRODUCTION AND BACKGROUND OF THE STUDY

Knowledge is now recognised as the primary organisational resource and as the only factor which can evoke change and innovation in an organisation. Indeed, this resource needs to be managed in order for the organisations to achieve their goals. The emphasis on the importance of knowledge as a new competitive advantage has led to the adoption of knowledge management (KM) in healthcare organisations (Omotayo, 2015). With the rapid changing landscape of healthcare, effective management of the knowledge base of healthcare professionals is becoming vital to delivering high-quality patient care. In this way, it is imperative for knowledge to be harnessed, managed and maximised for improved productivity (Kunthi, Sensuse & Tobing, 2017; Drucker, 1993). It is of the essence that healthcare professionals such as psychiatry nurses maximise the utilisation of knowledge resources effectively given the responsibility of patient care improvement and patient safety. The failure by psychiatry nurses to gain, access, share and apply current and relevant knowledge in healthcare leads to reduced patient care (Assem & Pabbu, 2016). The various factors that affect quality services and effective knowledge management (KM) in healthcare institutions include organisational structure and culture that impact on organisation operations. These affect how knowledge is shared and created among employees. Other factors that affect KM are lack of information technology that facilitate different types of knowledge and communication, poor leadership support and lack of human resource capabilities (Kiros, Mamo & Tesema, 2018).

Knowledge Management (KM) is important for psychiatry nurses because it can assist psychiatry nurses to improve the level of knowledge in order to identify mental disorder signs and symptoms, as well as equip them with skills that make them capable of providing proper care and meeting patient's needs (AlShibi & Ayam, 2012). A psychiatric nurse's duty is to provide physical and mental healthcare. Nurses alone among the various mental health disciplines combine the biopsychosocial knowledge, psychopharmacological competency, physical and psychiatric assessment skills with an intrinsic perspective of patient advocacy and 24-hour accountability. Psychiatric nurses are expert at evaluating complex psychiatric substance abuse, physical health needs and problems of patients over the lifespan (American Psychiatric Nurses

Association (APNA), 1997; Lee, 2017; Mutula, 2015). Without proper KM among psychiatry nurses, they might fail to diagnose and care for mental illness and unstable patients.

1.1 CONTEXTUAL SETTING

The study was restricted to Ingutsheni Central Hospital, located in Belmont East, Bulawayo, Zimbabwe. Ingutsheni Central Hospital is the largest psychiatric hospital in Zimbabwe, with a bed capacity of 708 and a daily average in- patient population of 600 or more patients. The hospital is a national referral centre for patients with mental health problems. The hospital was converted to a psychiatrist hospital in 1933 and it is missioned to providing quality mental health care services. The hospital is exclusively concerned with the treatment and rehabilitation of patients with psychological or mental disorders plus and post basic training in psychiatry nursing (Ingutsheni Central Hospital, n.d). Ingutsheni Central hospital has fourteen wards that accommodate 600 or more patients. As such, KM practices among psychiatry nurses is very important as psychiatry nurses are involved in treating different types of mental health sickness and staff rotation to the different wards and shifts require one to be up to date with the department's knowledge.

1.2 STATEMENT OF THE PROBLEM

KM is important for psychiatry nurses because it assists psychiatry nurses to improve the level of knowledge in order to identify mental disorder signs and symptoms, as well equip them with skills that make them capable of providing proper care and meeting patient's needs (AlShibi and Ayam, 2012). Indeed healthcare professionals such as psychiatry nurses should maximise the utilisation of knowledge resources effectively given the responsibility of patient care improvement and patient safety. The failure by psychiatry nurses to gain access, share and apply current and relevant knowledge in healthcare leads to reduced patients care (Assem and Pabbu, 2016). In healthcare institutions organisational structure and culture do impact on organisation operations, quality of service. They also affect how knowledge is shared and created among employees. Other factors that affect KM are lack of information technology that facilitate different types of knowledge and communication, poor leadership support and lack of human resource capabilities (Kiros, Mamo and Tesema, 2018). Against this background the researchers

investigated KM practices (acquisition/creation, sharing/transfer, storage, application) among psychiatry nurses and examined mechanisms and infrastructure for KM that were available, that assist to enhance KM practices to ensure effective quality service delivery at Ingutsheni Central Hospital.

2. RESEARCH OBJECTIVES

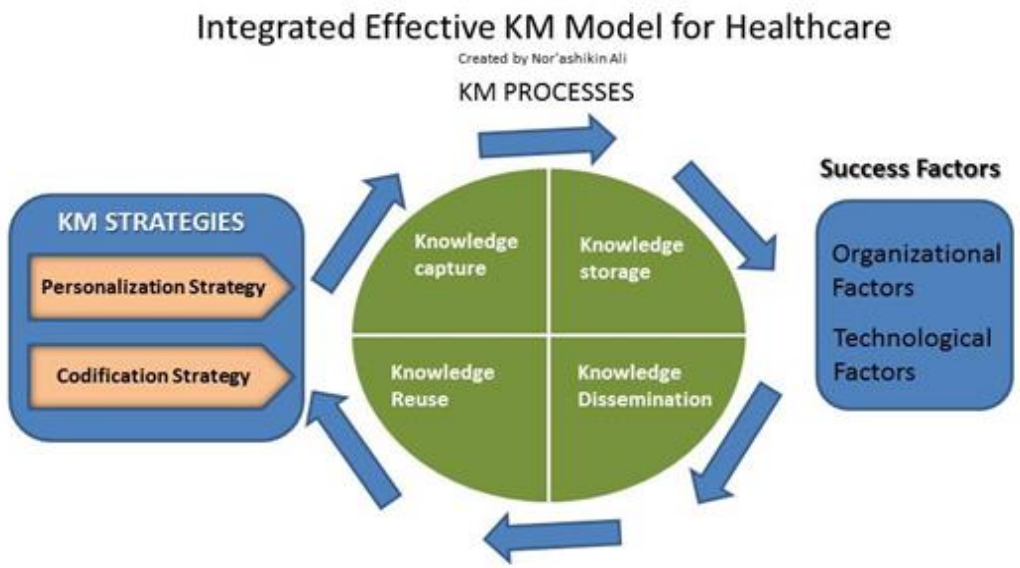
The broader objective of the study was to investigate how knowledge is managed and used among psychiatry nurses to deliver services at Ingutsheni Central Hospital. Specifically, the study sought to:

i. Investigate the type of knowledge that was generated, acquired, used and stored by psychiatry nurses at Ingutsheni Central Hospital.
ii. Determine knowledge sharing/transfer strategies and use at Ingutsheni Central Hospital psychiatry department.
iii. Assess mechanisms and infrastructure for knowledge management that are available at Ingutsheni Central Hospital psychiatry section.
iv. Establish the impact of organisational culture and structure on knowledge management at Ingutsheni Central Hospital Psychiatry Department.
v. Examine the outcome of knowledge management practices among psychiatry nurses on health care service delivery and patient care at Ingutsheni Central Hospital Psychiatry Department.

3. CONCEPTUAL FRAMEWORK

The study was guided by the Integrated Effective Knowledge Management Model for Healthcare by Ali, Tretiakov, Whiddett and Hunter (2017). The Integrated Effective Knowledge Management Model is a model that allows healthcare organisations to be able to incorporate KM processes (capture, storage, dissemination and reuse), KM strategies (personalisation and codification); and success factors (organisational and technological) into their existing system for a successful KM in healthcare. The integration of these factors guided the successful KM implementation. As such, the proposed components can function as a basis for healthcare organisations to evaluate their KM practices.

Fig 1.1 Integrated Effective Knowledge Management Model



Source: Ali, Tretiakov, Whiddett & Hunter, (2017: 332).

4. LITERATURE REVIEW

4.1 Type of knowledge generated, acquired, used and stored by psychiatry nurses

Knowledge can be categorised into many ways; the most common classification is that of tacit and explicit knowledge. Nonaka and Takeuchi (1995) define tacit knowledge as subjective and experienced based knowledge that cannot be expressed in words, sentences, numbers or formulae, often because it is context specific. Tacit knowledge is an important organisational resource as some of the corporate knowledge resides in the minds of employees and that the successful accomplishment of tasks depends on it (Anderson, 2009).

Nonaka and Takeuchi (1995) define explicit knowledge as objective and rational knowledge that can be expressed in words, sentences numbers and formulas (context free) it includes theoretical approaches, problem solving, manuals and databases. Anderson (2009) emphasised that explicit knowledge is frequently accessible through information clinical practice guidelines, written policies, and procedures within healthcare settings. Nonaka and Takeuchi (1995) developed the

theory related to knowledge and its creation on the basis of division and differences of tacit and explicit knowledge, which is called SECI Model (socialisation, externalisation, combination, internalisation). For knowledge practices, organisations require all four types of knowledge production at continuous basis.

4.2 Knowledge Acquisition

Gold, Malhota and Segars (2001:190) state that "acquisition-oriented KM processes are those oriented towards obtaining knowledge which can be described by many other terms such as acquire, seek, generate, create, capture and collaborate, all with a common theme - the accumulation of knowledge". Knowledge capture systems support the process of retrieving either explicit or tacit knowledge that resides within people, artifacts, customers or organisational entities (Becerra-Fernandez & Sabherwal, 2010). Acquisition of knowledge is important as it involves mobilisation of internal and external resources to ensure that there is generation of new knowledge that facilitate the organisation to achieve its goals, also to enhance service delivery through customer satisfaction, innovation and competitive advantage (Reio & Wisewell, 2000). In healthcare, knowledge is primarily derived from the sharing of clinical experience, skills and know-how while delivering health care to patients. Ajanaku and Mutula (2018:41) state that knowledge is acquired by clinical nurses through different learning activities within an organisation, such as training formal education, and independent learning.

4.3 Knowledge storage

Knowledge that is captured is stored in a knowledge repository. Knowledge storage involves storing and retention of both individual and organisational knowledge. Gold, Malhotra and Segars (2001) state that knowledge can be stored in file system storage, local and network directories, databases, emails and websites. A repository as argued by Hislop (2007) allows many people to search for, and retrieve codified knowledge without having to contract the person who originally developed it. This saves on time and other organisational resources thus improved performance. Due to the sensitive nature of healthcare data and the increasing risks of information security is important for healthcare providers to have a robust and consistent information security in place.

4.4 Knowledge sharing

Knowledge sharing basically means how organisational information is exchanged from one individual to the other or from a group to individual and vice versa (Darroch, 2003). Knowledge can be shared as both tacit and explicit knowledge. Knowledge sharing in healthcare can be defined as team members sharing task relevant ideas (skills, experience and understanding) information, and suggestions among researchers, policymakers, and common publics. The sharing of knowledge is necessary for adapting, extending and creating new knowledge and innovation Hislop (2007) as cited in Muhammd (2016).

Gold et al., (2001) state that knowledge can be shared through methods such as knowledge cafes, workshops, web-based communities of practices, social media, online community and blogs. Factors that can affect knowledge sharing in an organisation are organisational structure, culture, trust between individuals, time and confidentiality of information. Assem and Pabbu (2016) state that KM is very useful to most departments and sectors of the economy, and the healthcare sector is no exception. The study by Assem and Pabbu (2016) explored how healthcare professionals share knowledge in the Ghanaian healthcare sector. The results revealed that the healthcare facilities studied did not have any formal knowledge management systems, and therefore healthcare professionals relied on informal conversations and seminars to share knowledge. It also ascertains the challenges faced by healthcare professionals in Ghana with regards to knowledge sharing such as lack of trust, lack of technological facilities and lack of KM policies. More so, factors such as fear of getting extra task or responsibility, network failure (both mobile phone and internet) and culture are some of the challenge healthcare professionals face in sharing knowledge.

4.5 Knowledge Management Infrastructure

Lambe (2006:2) noted that knowledge and information infrastructure "mean all the things that combine to facilitate the flow of information and knowledge in support of the numerous tasks and actions and decisions that comprise of organisational activity". KM infrastructure can be classified as psychical IT infrastructure, devices, culture, structure and human resources

(Kushawaha & Rao, 2015). The KM infrastructure and mechanisms encourage KM practices in an organisation.

Masa'deh (2016) conducted a study aimed at identifying the role of KM infrastructure in enhancing job satisfaction at Aqaba five-star hotels located in Jordan. The results revealed that KM infrastructure has a significant positive impact on job satisfaction. Also, the study revealed that organisational culture followed by information technology, has the highest effect on job satisfaction whereas organisational structure is the least.

4.6 Information Technology

Information technology is important in supporting KM activities among nurses by incorporating various technological platforms. Technological platforms such as social media, content repositories, and dynamic websites (Kushawaha & Rao, 2015). Rouleau, Gagnon and Cote (2015), stressed that information technology improves collaboration, interaction between nurses and patients. Also, ICT enables knowledge sharing, expertise, improves timelines, quality and access to a variety of healthcare services.

In their study Fergus and Igwe (2013) examined the benefits and factors that affect the use of ICT in Nursing Profession in Ebonyi State. They stated that the benefits of ICT in health sector minimises paperwork, it is used for hospital management such as demission, health informatics and appointment management and it makes information available for the use by the hospital personnel in an easily readable form. Furthermore, Fergus and Igwe (2013) noted that the factors affecting the use of ICT in health sector range from people, government and scarcity of ICT infrastructure to resistance to change, lack of maintenance culture, internet connectivity, electric power, and cost of government. Technology therefore requires the support of other KM enablers such as organisational culture, structure, and business strategy to ensure that the right knowledge is being managed in the right way.

4.7 Organisational culture and knowledge management

Organisational culture has been defined as the specific collection of values and norms that are shared by people and groups in an organisation and that control the way they interact with each

other and with stakeholders outside the organisation (Masa'deh, 2016). The organisational process of KM culture is one of the best corporate strategies for the transfer of information and is a factor in the success or failure of an organisation (Becerra-Fernandez & Sabherwal, 2010). When employees have a culture of sharing and transfer valuable information in the enterprise, corporate objectives are accomplished (Foss, Husted & Michailova, 2010).

Factors that can affect an organisation to have good organisational culture is the organisation vision, mission, and values of the organisation, the technology employed, organisational structure, and the management style, as well as external factors such as social environments of the organisation (Lemon & Sahota, 2004). Sensuse, Suchayo, Rohajawati, Rizqi and Anggia (2016) in their study examined organisational culture of hospital in Indonesia. They examined four types of culture that might influence KM which are market culture, hierarchy culture, clan culture and adhocracy culture.

4.8 Organisational Structure and Knowledge Management

Organisational structure consists of rules, policies, procedures, and processes, hierarchical levels, departmentalisation of employees and systems of motivational incentives and coordination of work processes within the firm (Gold et al.; 2001). As such, organisational structure is an important enabler for KM in an organisation. Shukri & Ramli (2015) in their study that focused on top management using Balanced Score Card in the investigation of organisational structure and performance of Malaysian private hospitals. The results revealed that the hospital structure was highly centralised and formalised. The private hospital makes use of the formalised rules and written formal procedure to ensure the management and governance of health providers act in accordance with espoused values.

4.9 Knowledge management and service delivery among psychiatry nurses

The World Health Organisation (2018) state that quality of care is the degree to which healthcare services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. KM practices positively and significantly influence service delivery. This is supported by Chebet and Njuguna (2020) who stated that

knowledge sharing has positively influenced on service delivery at Oxfam International. The study established that to a larger extent Oxfam employees obtain a good extent of new knowledge from external sources, business partners, exchange of knowledge among co-workers, written sources, knowledge is exchanged though formal procedures and employees in the organisation consider their knowledge as an organisation asset and not their own source of strength (Chebet & Njuguna, 2020). Ajanaku and Mutula (2018) in their research finding revealed that information technology, organisational structure and organisational culture are found to positively and significantly influence KM processes in the selected teaching hospitals.

5. RESEARCH METHODOLOGY

The study was guided by interpretive paradigm which believed in many realities gathered through subjective means and interpreted from the researcher's point of view. Both quantitative and qualitative methodologies which employed document analysis and questionnaires as instruments to gather primary data on a case study research design were used. The study population included all psychiatry nurses currently employed at Ingutsheni Central Hospital, and the study sample picked represented 30% of the targeted population. The response rate was 75%. Purposive sampling and convenient sampling was used to select psychiatry nurses from the different wards in the hospital to participate in the study. A sample size of thirty-six (36) respondents was targeted but twenty-seven (27) respondents participated in the research. Quantitative data was analysed using Excel and data was presented using frequency tables while Qualitative data was analysed and presented thematically and descriptive narratives.

6. RESULTS

6.1 Type of knowledge generated, acquired, used and stored by psychiatry nurses

The findings revealed that registered mental healthcare nurses acquire, generate, share and store different types of knowledge (tacit and explicit) such as, *"client biography, medical history, social background, handling aggressive patients, managing and monitoring patients' conditions"*. Also, knowledge such as "*giving health education to patients and their relatives and reporting drug adverse of side effects is shared, stored and acquired. More so, knowledge on hospital policies, procedures and manuals is shared, acquired and stored among registered mental healthcare nurses*."

The finding corroborates Lin and Hsieh (2006) who in their study expressed that delivering safe and high-quality services to patients is highly dependent on sharing four types of knowledge which are medical, scientific, incident and experience knowledge while, Mohajan (2016), stated that healthcare professionals need to share the technical, social and behavioral and ethical and emotional knowledge.

The data collected revealed that most of the registered mental healthcare nurses showed that acquisition of new knowledge is a priority. Some of the respondents explained that they "*have to acquire new knowledge to be able to administer and treat patients properly"* and also, "*be able to know what the other work shift did so that they can continue with work processes properly."* In addition, others stated that knowledge acquisition is a priority as "*it assists psychiatry nurses to generate new knowledge which might assist to solve some problems/issues in the department"* or "*caring for patients better*" and also it will assist them *"in making informed decision making*." Knowledge acquisition has a direct and significant impact on service delivery and patient care; hence everyone among psychiatry nurses has a mandate to acquire new knowledge. This finding is similar to that of a study conducted by Ajanaku and Mutula (2018) revealed that all dimensions of KM process (acquisition, conversion, application and protection) have direct and a significant relationship with organisational effectiveness. As such, knowledge effective use, and the acquisition of new knowledge are considered the only way organisation can sustain a competitive advantage.

The research findings revealed that registered mental health care nurses generated or acquired knowledge through interacting with patients, social interactions on Facebook, Instagram and LinkedIn, workshops, mentorship, training, work guidelines and operating manuals. The findings confirm Ghosh and Scott's (2007:76) study which indicated that in healthcare organisations, "the key KM transaction occurs between the nurse and the patient". Also, data collected revealed that employees become familiar with the hospitals policy, vision and mission statement through employee's orientations, social interactions during tea breaks or lunch breaks and face to face meetings. The platforms used by registered psychiatry nurses assist them to acquire both tacit and explicit knowledge resources in order to retain and build organisational memory for access

and use. The study also, revealed that ward rounds are also part of KM processes involved in nursing care confirming Chebet and Njuguna (2020) whose study established that to a larger extent, employees obtain a good extent of new knowledge from external sources, business partners, exchange of knowledge with coworkers, and employee rely on written sources.

The results of the study revealed that explicit knowledge among registered mental healthcare nurse is stored mostly as written down reports both physical hard copies and electronically and also, as videos from training workshops. This finding confirms Gold et al's (2001) study that knowledge can be stored in file system storage, local and network directories, databases, emails and websites. Storing knowledge especially tacit knowledge is important, as it allows an organisation to retain its knowledge which might be lost due to retirement, promotions to other departments or one leaving a workplace.

6.2 Strategies used for knowledge sharing/transfer

The study sought to establish the strategies that are used for knowledge transfer. The results presented in Table 1 shows that there are different spaces that are used by psychiatry nurses to share and transfer knowledge.

Table 1: Knowledge sharing spaces (n=27)

Knowledge sharing spaces	Frequency (n)	Percentage
Conferences	5	19%
Case studies presentations	10	37%
Seminars	11	41%
During tea breaks	14	52%
World mental healthcare	15	56%
During lunch time	15	56%
During knowledge cafes	18	67%
Apprentice	20	74%
Workshops	25	93%
Mentorship	25	93%

Source: Field data: 2021

The results indicate that knowledge sharing among registered mental healthcare nurses is done mostly at workshops and through mentorship (25:93%). These were followed by apprentice with (20:74%) respondents. The results revealed that conferences (5:19%) are the list knowledge sharing space. This was explained by some respondents that conferences are "not held as often as workshops". About 10(37%) respondents included case study presentations and 15(56%) respondents indicated World Health Day as a space where that knowledge is also shared. The World Mental Health Day was globally celebrated on the 10th of October each year. Knowledge sharing spaces enables psychiatry nurses to be able to socialise, externalise, combine and internalise knowledge. However, these activities might be affected by the organisational culture and structure. The findings are similar to those of Lambe (2006) who identified the virtual discussion forums, collaborative virtual space, storytelling or narratives, mentoring, peer review, lessons learned knowledge map and organisational memory as spaces that facilitate KM.

The study sought to establish the Community of Practices (CoPs) that psychiatry nurses belonged to. It emerged that registered psychiatry nurses belong to different community of practices (CoPs). The study revealed that 23 (85%) of the respondents belong to the same CoPs called Mental healthcare professionals' network and 12(44%) respondents belong to Mental healthcare, rehabilitation and prevention group. Only 8(28%) of the respondents belong to the Substance abuse and Mental healthcare service administration and 4(15%) of the respondents do not belong to any CoPs. It is of importance for the hospital leaders/management to encourage every psychiatry nurse or healthcare profession to be part of CoPs. CoPs have a culture to build on professional networking, and exchange knowledge and skills. This will assist an organisation to gain wide range of expertise and fuel continuous improvement in service delivery (Nonaka, 1995).

The findings revealed that sharing knowledge about mental health assist in improving service delivery because it enabled the registered psychiatry nurses "to make fast and informed decisions about patient care", "it prevents medical errors" and "to keep up to date with mental health issues and patient care". These findings confirm Hislop (2007) as cited in Muhammd (2016) who reveals that sharing of knowledge is necessary for adapting, extending and creating new

knowledge and innovation.. Again the findings are in sync with Tabrizi and Morgan (2014), cited in Munhammd (2016) who stated that health information sharing between patients and their healthcare providers may improve diagnoses, increase patient education and promote self-care and reduce medical error.

6.2 **Mechanisms and infrastructure for knowledge management**

KM mechanisms offered by an organisation should be equal and fair to everyone such as telephone calls, access to internet, attending of workshops and seminars. Equal and fair treatment for employees will enable willingness of individuals to share and acquire knowledge (Becerra-Fernandez and Sabherwal, 2010). Hence this study sought to establish the mechanisms that the mental healthcare department uses for the purposes of knowledge creation, acquisition, storage, sharing and facilitating collaboration among psychiatry nurses.

The results indicate that the most used mechanism for KM is documentation of existing knowledge (26:96%) followed by mentoring and workshops (25:93%) and followed by training (24:88%). Documentation of existing knowledge is mostly used as a mechanism for KM because registered psychiatry nurses have to document each and every treatment that is done or given to the patients for reference purposes. Mentorship and training are always ongoing training programmes in the department. Face to face meetings respondents revealed that, “they are mostly conducted every week or before one starts a shift so that they can be up to date with the patients’ needs and treatment”. Telephone calls are not frequently used, and some of the respondents stated that, “not everyone in the department has the privilege of using the telephone”. The least mechanism for KM used is newsletters and employment of shrewd individuals. Some respondents further explained that newsletters are, “hardly used at the department because they are expensive to produce and the hospital is not a profit-making organisation, hence the services that they render to the public are for free”. The above findinds are summarized in Table 2 below.

Table 2: Mechanisms for KM (n=27)

Mechanism for KM	**Frequency (n)**	**Percentage**
Employment of shrewd individuals	5	19%

Newsletters	5	19%
Telephone calls	6	22%
Chat rooms	7	26%
Brainstorming	10	37%
Storytelling	10	37%
Seminars	11	41%
Communities of practices	15	56%
Utilizing casual chats	19	70%
Dialogue with each other	19	70%
Face to face meetings	20	74%
Training	24	88%
Mentoring	25	93%
Workshops	25	93%
Documentation of existing knowledge	26	96%

Source: Field data: 2021

6.3 **ICT's platforms used by the mental healthcare department for KM**

Technology allows nurses to find, interpret, organise and appraise information from different sources for better and informed decision-making and problem solving within patient care. Technological platforms such as social media, content repositories, and dynamic websites are used (Mills and Staggers, 1994). Based on this understanding the study sought to determine the ICTs platforms that the mental healthcare department used for knowledge creation, acquisition, storage, sharing and facilitating collaboration, results indicate that physical devices (smartphones, computers, tablets, desktops) are used by all (27:100%) the respondents. Physical devices are followed by social media which had (25:93%), online research and online collaboration had (12:44%). The least ICTs platform used for KM practices are emails which had (5:19%). The respondents revealed that emails (5:19%) are the least used as ICTs platform because most of their "work is documented on paper and filing patients' information was through a card system. The hospital information system available can only be assessed by the sister in charge of the acute care in-patient wards; hence they are the only ones who can share knowledge

through the use of emails". In so doing, this affects knowledge sharing among psychiatry nurses as a selected few registered psychiatry nurses are the one who are able to access certain platforms unlike others. Extant literature has emphasised on the importance of ICTs in ensuring efficiency and effectiveness of KM practices in an organisation (Gold et al, 2001).

Regarding KM challenges in service delivery that they faced through the use of available ICT infrastructure, the results revealed that there is inadequate ICT infrastructure such as laptops and desktop to assist in service delivery, hence some registered psychiatry nurses end up using their own personal devices. In so doing, the hospital run the risk of losing knowledge as psychiatry nurses might hoard the knowledge that is stored in their personal devices. It also emerged that internet connectivity, erratic power supply is always a challenge at the hospital hence, online KM practices are affected. This finding confirms Mils and Smith (2010) who concluded that technology influence performance indirectly through knowledge infrastructure capabilities along with organisational structure and culture. Similarly, Rouleau, Gagnon and Cote (2015) pointed out that the use of ICTs by nurses can impact their practices by promoting patient-centered healthcare and improving quality of care. These ICT challenges affect KM practices among registered psychiatry nurses.

The findings of this study corroborated with the findings of Ajanuku and Mutual (2018) study which revealed that two teaching hospitals under study do not have enough capability to adopt new technologies due to inadequate IT infrastructure and inadequate funding. Also, the challenges faced when using ICT is that lack of IT policy, high work demand, unavailability of computers, and lack of access to computers, erratic power supply, and lack of support from the Federal Government. The poor state of healthcare delivery in the African continent can be attributed to poor technological infrastructure (Akinsola, Herselman and Jacobs, 2005). The organisation and evaluation of information for informed decision-making and problem-solving is enhanced by the application of technology in nursing delivery (Lambe, 2006).

6.4 **Effects of organisational culture and structure on knowledge management**

Asked if there was a culture of knowledge sharing in the psychiatric department 20 (74%) respondents responded in the affirmative while 7(26%) respondents objected. A culture of sharing in an organisation enables an organisation to gain competitive advantage and have effective and efficient service delivery. However, Assem and Pabba (2016) are of the view that organisational culture and structure are elements that do not have significant direct contribution to organisational performance.

Majority (20:74%) of the respondents stated that norms affect knowledge sharing in the department, followed by language (17:63%), technology advances (15:56%), values (12:44%) while mistrust and beliefs (9:33%) were the last. Interestingly the findings of the study showed that dressing does not affect knowledge sharing, presumably due to the fact that everyone will be in nursing uniform, hence no one is affected about how one is dressed. Organisational norms have to be relaxed by management to enable effective KM practices. The research findings revealed that there are different types/forms of incentives or rewards that are available to encourage knowledge sharing, generation, acquisition at the mental health care. They include monetary value, certificate of attendance, fully sponsored workshops and recognition. However, some respondents argued that to a lesser extent monetary value and workshops are used to encourage KM practices at the department. This is due to the fact that these rewards benefit a certain few individuals in the department. The research findings corroborate with Chong and Choi (2005) who revealed that senior management support the promotion of the registered nurses, incentives and sponsorship to workshops and seminars for effective and efficient nursing care delivery.

The findings also revealed that management/leadership support KM practices in the hospital through facilitating sponsored workshops, facilitating induction courses, attending clinical meetings, facilitating continuing professional education and training. The supportive nature of management/leadership in an organisation is an important characteristic to facilitate and promote KM practices in the hospital to be able to enhance service delivery and patient care. This finding is similar to that of Ajanuku and Mutula (2008) who highlighted that nursing leadership team

plays a crucial role in the provision of infrastructure and policy-direction in ensuring nurses are empowered to practice professionally and thus deliver high-quality care.

6.5 **Policies in place to support knowledge management in the organisation**

A Knowledge management policy is important as it will act as a guide on KM processes such as how to capture, acquire, store and share knowledge. Nonaka and Takeuchi (995) state that it includes a set of procedures, rules, guidelines and regulations that guide staff on their work processes which include methods to acquire, create, organize, share and transfer knowledge to fit different situations. KM policy will enable an organisation to retain both tacit and explicit knowledge, improve efficiency, productivity and build organisational memory. Wamundila and Ngulube (2011) think that the absence of documented policies reflects an organization in dire need of business process re-engineering. Therefore this study sought to establish any policies on knowledge management in this hospital. The results revealed that there are no specific or written down knowledge management policies in the hospital. However, some respondents stated that there are policies that can ensure KM practices among psychiatry nurses such as "all staff have to go through orientation and induction courses", while some policies encourage "feedback on meetings of workshops attended for the benefit of those who did not attend the workshop in which this enables knowledge to be shared, generated and acquired among psychiatry nurses." Majority of the respondents showed that the nature of organisational structure enhances trust, communication and knowledge sharing among psychiatry staff through "the set down rules and procedures of the hospital which assist them to adhere to certain ethics that assist them to enhance trust between psychiatry nurses, certificate of attendances enhances knowledge sharing and sponsorship of workshops and training programmes". However, other respondents stated that, "lack of proper remuneration and working conditions affect knowledge sharing among psychiatry nurses.

Respondents were asked to indicate factors that affect knowledge sharing within the psychiatry department. Majority (24:89%) indicated that lack of ICTs infrastructure hinders knowledge sharing in the department. Lack of ICT infrastructure such as psychical devices (computers, desktops and smartphones), affect knowledge sharing thus. Most of the respondents stated that

they use their own personal devices. It emerged that time constraint and mental attitudes (21:78%) and confidentiality of information (19:70%) affects knowledge sharing where some knowledge about patients or the hospital is restricted to a certain individual in the department. Nevertheless, similar figure (6: 22%) of respondents indicated that lack of incentives, culture while structure (12:44%) affects knowledge sharing in the department. As such, these factors that affect knowledge sharing in the psychiatry department affect KM practices to enhance service delivery and patient care.

The research findings are are similar to those of Assem and Pabbu's (2016) who in their study ascertain challenges faced by healthcare professionals in Ghana with regards to knowledge sharing such as lack of trust, lack of technological facilities and lack of KM policies. More so, factors such as fear of getting extra task or responsibility, network failure (both mobile phone and internet) and culture are some of the challenges healthcare professionals faces in sharing knowledge.

6.6 Effect of knowledge management practices on health care service delivery and patient care among psychiatry nurses

Respondents were asked to explain how knowledge management practices (acquisition, sharing, and storage) affect service delivery among psychiatry nurses. Findings indicate that KM do impact through the following:

"It results in improved patient safety performance in the hospital, KM allows the excellent, timely and optional healthcare of the nursing professional when they need it to help them make high-quality, well-informed patient care decisions, no room for medical errors, it powers collaboration in information and medical professionals, it improves communication with patients and between psychiatry nurses and it ensures consistency and continuity of patient care."

The findings of the current study revealed that there is a relationship that exists between KM practices, KM mechanisms and infrastructure, organisational culture and structure, which plays a considerable role in improving service delivery and patient care among registered psychiatry nurses. The findings of this study are in agreement to those of Bharadwaj, Chavhan and Roman (2015) on the impact of KM capabilities on KM effectiveness. The study established both

infrastructure capabilities and process capabilities play an important role in improving KM effectiveness.

7. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that registered mental healthcare nurses acquire, generate, share and store different types of both tacit and explicit knowledge. Mentorship, workshops and apprenticeship emerged as the clear strategies for transferring knowledge. The study concluded that KM mechanisms and infrastructure, organisational structure and culture have an influence in KM practices such that they can positively and significantly enhance service delivery and avoid medical errors in patient care. In light of the above the study makes the following recommendations:

1. The Hospital should implement a KM policy which will assist in making informed decisions and actions to be taken in the creation, generation, use, sharing/transfer and storing of knowledge to continue effective and efficient service delivery and patient care.
2. The Hospital should have proper, adequate and modern information and communication technology (ICT) infrastructure such as desktops, laptops, backup solar energy for erratic power supply and internet connectivity. These ICTs infrastructure should be equally shared and used by all psychiatry nurses to enhance KM practices among everyone.
3. The Hospital Management should incorporate more remuneration and incentives to encourage knowledge management practices among psychiatry nurses.
4. Psychiatry nurses should cultivate a knowledge friendly culture, sets of beliefs and values to be able to share knowledge among themselves.
5. Psychiatry nurses at Ingustheni central hospital should establish their own CoPs which will encourage them to share knowledge. The Hospital should implement KM measurements (which are indicators and metrics for measuring KM) among psychiatry nurses.

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COVID-19; GOVERNMENTAL TRANSPARENCY AND THE PUBLIC HEALTH AGENCY OF SWEDEN

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Abstract
Swedish administrative law includes great possibilities to transparency for the general public. According to The Principle of Public Access to Information all completed documents at a government agency can by default be accessed by the public if not the agency can motivate legal secrecy. Their motives for secrecy must have a foundation in the Public Access and Secrecy Act. This legal tradition is very old and was introduced as early as 1766. During the COVID-19 pandemic (2020 and forwards) the work at governmental agencies have not been easy. Offices have been closed temporarily and contact with the public have been limited because of restrictions. The workplace has been moved from the traditional office space to digital environments as employees have been forced to work from home. The Public Health Agency, who have the main responsible to communicate with the public regarding matters of the pandemic, have had many requests for information during this time. In this paper reactions from media and the public regarding The Public Health Agency's information management is investigated.

Keywords: *Public Access, SARS-CoV2, COVID-19, Sweden, Media, Transparency,*

INTRODUCTION

The Swedish administrative laws includes great possibilities to transparency for the general public. According to *The Principle of Public Access to Information* all completed documents at a government agency can by default be accessed by the public, if not the agency can motivate legal secrecy. Their motives for secrecy must have a foundation in the Public Access and Secrecy Act (Swedish Government 2020). This legal tradition is very old and was introduced as early as 1766 (Gränsström et al 1992). During the COVID-19 pandemic (2020 and forwards) the work at governmental agencies has not been easy. Offices have been closed temporarily and contact with the public have been limited because of restrictions. The workplace has been moved from the traditional office space to digital environments as employees have been forced to work from home. The Public Health Agency, who have the main responsible to communicate with the public regarding matters of the pandemic, have had many requests for information during this time. To facilitate communications the Public Health Agency has held regular press conferences,

but this was not enough to hinder misunderstandings and conspiracy theories. After the Swine-flue pandemic of 2009 the Swedish Civil Contingencies Service published a report concerning communication between the authorities and the media – and how the measures taken were treated in the public opinion. In the report the Civil Contingencies Service claims that the public was very satisfied with how the authorities handled the pandemic, but less satisfied with how the pandemic were reported in the media (Swedish Civil Contingencies Service 2009, p. 113ff)
During the COVID-19 there was also a conflict in media regarding e-mails sent from employees at the Public Health Agencies to certain organizations in which different opinions than stated at the press conferences were expressed. These e-mails were retrieved by journalists using the principle of public access to information. There was also a discussion about "Hate-mail" (Threatening e-mails sent by the public) to The Swedish Public Health Authority and a collection of these e-mails was published by the journalist Ola Wong. We will return to both these discussions later on.

What can an investigation on Public Administration reveal to us? Bruno Latour conducted his ethnographic investigation of the Conseil d'État between 1994 and 1999 and published his findings in *The Making of Law –An Ethnography of the Conseil d'Etat* in 2002. According to Latour we often base our understanding of government work in the decisions they make and print on paper (or today, publish on their website). But this is just the end of a process, and gives us no further insight in how the actual work is done (Latour 2009, p. 71). Research of the actual administrative processes, and the reactions to them, could teach us much more than just an official document with a governmental decision. It gives us the possibility to gaze into the black box of governmental work and hopefully a possibility to understand what really happens within administrative processes. This knowledge is not just important to researchers, but also key knowledge to archivists. In this paper I will conduct an investigation that puts focus on the complete administrative process regarding Access of Public Information at the Swedish Public Health Authority. I am hopeful that this will give us the possibility to shed som light on the processes within the black box of government administration.

RESEARCH QUESTIONS

The investigation is performed through the answering of three research questions.

RQ1 - How was the Principle of Public Access discussed by the media?

RQ2 - How was the Principle of Public Access used by the public to request for documents created during different periods of the COVID-19 pandemic?

RQ3 – What are the administrative process initiated when a request for Access of Public Information was made to the Swedish Public Health Authority during the COVID-19 pandemic?

Data relating to the first research question regarding on how the principle of public access was discussed in the media was gathered through internet searches. The possibility to perform a site-search (site:www.website.com keywords) in Google was used on a number of larger nationwide newspapers and radio stations. Complementary to the site-search, more general searches were conducted regarding the Swedish Public Health Authority and Public Access, and searches using the news sites internal search engines. The goal was to find a wide range of discussions regarding the subject in media. Blogs from independent journalists will be included in the material, but not podcasts and vlogs due to time limits.

To gather material regarding the second research question required more work. Using a timeline application available on the Public Health Authority's website, a number of hotspots, dates when certain events (lockdowns, heavy rise in infections etcetera) could have increase the public interest, was identified. Complementary, dates surrounding media focus regarding public access and the Public Health Authority was used. These dates were chosen using the articles found relating the first research question. These dates were used to guide my requests to the Public Health Authority to access their public registers (diarium) over incoming correspondence. A

more thoroughly research could have been done by accessing the public registers for every date during the pandemic, but this was not possible due to time limits.

The theoretical framework will be used simultaneously as a beacon searching for parts of the material connected to transparency and democracy, and as a net connecting different parts of the material. It will be used in a way close to Max Weber's idea of "Ideal types" - descriptions of phenomenon that is used to sharpen the analysis of empirical material by creating something to compare the material with (Steiner 2009, p. 207).

Data for the first question was collected through an investigation of articles written during the pandemic and in which transparency is discussed. The second question by using the Principle of Public Access to access the registers at the Swedish Public Health Agency and retrieve the requests done by the public. To analyze the gathered material theories constructed by Chantal Mouffe (Mouffe 1999) and Jürgen Habermas (Habermas 2001) will be used. They will supply a theoretical framework that will be used as inputs to analyze aspects of democracy and transparency. The questions will be answered through the parts of the article dedicated to investigation and analysis. In the end of the article I will discuss possible solutions for problems encountered in the material.

THEORETICAL FRAMEWORK

In this part of the paper the theories contained in Chantal Mouffe's text *Deliberative Democracy or Agonistic Pluralism?* and Jürgen Habermas *Strukturwandel der Offentlichkeit - Untersuchungen zu einer Kategorie der bürgerlichen Gesellschaft* are explained and discussed. The goal is to explain a theoretical framework that enables an analysis of the discussion in the media, and also to support the analysis of the requests of public information performed by the public to the Swedish Public Health agency.

Mouffe's article was published in 1999 and aimed to explain why there was a growing disaffection with democratic institutions in western societies. According to Mouffe, the disbelief in democratic institutions are difficult to explain with contemporary political theory, rooted as it

is in a framework consisting of individualism, universalism and rationalism (Mouffe 1999, p. 745). Mouffe buildt her theory on influx from Jürgen Habermas and Seyla Benhabib. In Mouffes interpretation of Benhabib one of the problems with the contemporary political climate is to combine references to a common good with the free will of the independent individuals (Mouffe 1999, p. 746). In the article we are floating in a sea of political theory without any examples to hold on to, but one example that fits pretty well is the debate around mandatory COVID19-vaccines where the complexity of this conflict between common good and an independent individual is very clear. Mouffes critique of "deliberative democracy", the discourse of political theory that Habermas, Benhabib and many other researchers are part of is based on a conflict regarding the philosophy of human communication. It is a conflict, according to Mouffe, that can be explained by two concepts we find in the texts of the philosopher Ludwig Wittgenstein. *Einverstand* – (agreement) which is a product of reason. It is the result of a discussion where the rules of logic and rationality has been used and the "winner" is the one which arguments are the best according to logic and rationality. The other concept is *Einstimmung* (attunement) which also is a result of a discussion, but not connected to rationality in the same way. It is a more advanced agreement, a fusion of voices made possibility by a common form of life (Mouffe 1999, p. 749). The political theorists searches after *Einverstand*, but the people in general might deliver *Einstimmung.*

Jürgen Habermas was mentioned in the description of Mouffes critique above. But what I will use from his bibliography is not a text connected to the discourse of deliberative democracy. Instead it is his book *Strukturwandel der Öffentlichkeit* which focuses on the changes in societies that were needed for the contemporary administrative landscape to appear. Habermas describes a development in society where administration and logistics goes from unregulated and sporadic to regulated and regular. This is something that happens relatively late in history – in the west mostly during the 19th century (Habermas 2001, p. 70ff). I want to situate the kind of administration I have described above, Public access and Governmental transparency, to this process. It is at least one of the results of this process. The german word Habermas uses to describe the state of society (*der Öffentlichkeit*) is *Permanenz* – Permanence (Habermas 2001, p. 71). Institutions in contemporary western society are in general permanent in such way that

power is valid over a longer time period. This makes it possible to develop the administration over a long period of time. As an example - The predecessors of the Swedish Public Health Authority goes back to 1909 when a bacteriological institute was created which had similar tasks (NAD 2022).

FINDINGS

The investigation is divided into two parts. First the discussion in the media will be taken into account and the media material will be investigated in chronological order. The second part is regarding the use of public access. This part starts with a description of the process used by the Public Health Authority to serve requested information to the public, and to answer questions in general from the public, the government and other governmental agencies.

The discussion in the media

The findings of this study indicates that it took about six months into the pandemic, in the middle of 2020, to shift some of the media focus from the pandemic itself, to the administrative procedures surrounding the measures taken to control it. The Swedish National Radio reported on the first of June 2020 of change on routines in the Public Health Agency had led to that minutes from meetings between regional administrative bodies for disease control had been declared as being non-public and kept under secrecy. The journalists were concerned because this makes it impossible to compare the actual situation (as stated by the regions) with what the government declares as the official situation (SR 2020). The news were also picked up by magazins such as *"Sjukhusläkaren": "The Hospital Physician"* (Sjukhusläkaren 2020). The journalist Patrik Lundberg from the nationwide evening newspaper *"Expressen"* (*"The Express"*) commented on this episode and connected it to other organizations where there had been similar development regarding loss of openness. He argued that the loss of openness, especially regarding the Public Health Agency, is very unfortunate – the society loses openness when it actually is needing it the most (Lundberg 2020).

During 2020 the Public Health Agency had a lot of work on their lot. To manage the workload they employed consultants for general or specific tasks. One of these consultants was Johan Giesecke, the retired former director of the agency. The former director has, in his new role, been described as an *Éminence grise*, and an actual puller of the strings in the background. The journalist Emanuel Karlsten has done a major work examining Giesecke's e-mail correspondence during his period as an consultant. The material Karlsten got access to, using the principle of public access, was a series of e-mails sent and received from Giesecke's e-mail accounts at the Public Health Agency and at Karolinska Institute, which is the university where Giesecke is a senior professor. The e-mails were sent between Giesecke in his two positions and different key persons connected to the Swedish and Norwegian disease control. The material seems to give us a quite good view of what happened behind the scenes including Giesecke apologies during periods where the debate was heated. There are some examples that Karlsten identifies as possible conflict of interest and some e-mails of more social character (Karlsten 2020). A fuller discussion on this aspect is presented in the analysis.

Later during 2020 e-mails received and sent by the Public Health Agency would be in focus again. This time it was the executive director of the agency, Anders Tegnell, who was accused of deleting e-mails he received from different sources. The loss of e-mails was discovered when journalists examined the log files from the Public Health Agency e-mail server, which they had obtained through requesting information for public access. While trying to access e-mails from the log files some of the e-mails were discovered to be missing. The explanation for deleting them was, according to the agency, that they were deleted after an appraisal process in which they were deemed not to be valuable as permanent records. This was disputed by the press. The result was an article explaining that the Public Health Agency destroyed information concerning the pandemic, and roughly what their explanation were for this action. In the article there were also references to e-mails that the journalists did not gain access to because they were under the secrecy act. Some of these e-mails were related to face masks, which was the focus of a rather heated discussion among press and public in Sweden during this time (Sandberg 2020).

The last discussion in the media I will analyze is built upon the public contacting the Public Health Agency. During 2021 there were reports that people who were displeased with the agency's work e-mailed hateful and threatening messages to it. The journalist Ola Wong decided to investigate what the content of these e-mails was and did a request for all e-mails that had been categorized by the agency as hateful. The result was a large pdf-file containing all these e-mails that he together with his article presented to the public. In the article it is reported that an expert in security for government agencies investigated the e-mails and came to the conclusion that only the content of one of these e-mails would be classified as an actual threat in the legal sense (Wong 2021). We will return to classification of e-mails arriving at the Public Health Agency in the next part of this paper.

Use of public access

For the public, to apply for access to a document kept by the Public Health Agency the first step is to contact them in some way. Showing up at agency and ask, send an e-mail or a letter, fax to their fax number, or call the number of their operator asking to be connected to the registry office. In most cases their request would end up as a note (a row) in the digital registry. In the case of a request via telephone or by showing up in person this might not produce an entry, if it is a quick question regarding a document without secrecy that can be shown or handed over as a copy (or read over the telephone). In other cases it will be noted in the registry as an (incoming) request for public access to information. The template for the registry of the Swedish Public Health Agency consist of a number of metadata entries applied on both document and file level. The heading for all documents included in the file, and a central heading for the file itself. The date the file was created and the dates all included documents were created or received. The process within the agency the file is connected to and all employees that are working with the case. There are also metadata regarding how and why the file were created, if the creation were initiated by an internal process or if it was initiated by an external agent (SPHA 2021). Request for information from the public would be registered as coming from an external agent.

There are several instructions to the employees of the Public Health Authority. The employees are supposed to answer in a general way to questions regarding public health, and not get

involved in specific cases that the public asks about. They should carefully take notice of the tone in the discussions on the Public Health Authority's social media and pick up subjects that could be necessary for them to make a public announcement about. The employees are reminded of the Swedish Administrative Procedure act, SFS 2017:900, in which the government agencies are bound to offer service to the citizens without delay and with legal certainty (SPHA 2021b). In January 2020 the Public Health Authority created a specific e-mail address designated to questions regarding COVID-19. E-mail arriving at this address are categorized and forwarded to different addresses. The e-mails are color coded according to urgency and content, answered or forwarded to a civil servant appointed to answer a certain type of questions (SPHA 2021c).

From the Public Health Authority I requested the register of all incoming mail and e-mails on five specific dates during the pandemic. The register is an Excel-file for each requested date. The dates (2020-02-26, 2020-04-20, 2020-10-29, 2021-02-22, 2021-05-24) are all connected to a period with an increased rate of spread of Covid-19 in Sweden.

DATE:	TOTAL AMOUNT:	MAIL FROM THE PUBLIC:
2020-02-26	275	167
2020-04-20	247	139
2020-10-29	236	161
2021-02-22	91	1
2021-05-24	58	~2

The Public Health Authority has categorized incoming mail from the public in two categories: questions and opinions. Added to the categorization are a specification of the subject: "Question regarding vacation in London", "Opinion on the use of face masks" et cetera. Through the headlines it is not possible to see any formal request for information, the questions are more general. During 2020 there was a significant higher amount of requests from the public. As it seems the interest from the public is significantly lower during 2021. There are, on the 2020-10-29, a group of e-mails with the same or similar subject regarding an UNESCO-declaration from 2005 "Universal Declaration on Bioethics and Human Rights" (UNESCO 2005). According to the e-mails, the UNESCO declaration does not agree with mandatory vaccines our vaccine-

passports. This seems to be some kind of organized campaign to protest measures that have been suggested to be implied by the state. In general the contact with the public are mostly in the form of questions regarding how to interpret the new directives from the agency.

ANALYSIS

Chantal Mouffe describes how the political climate in the Western world has turned suspicious with a lower trust in the authorities. There are a few direct signs of this in the material studied. It becomes clear if one look at the discussion in the media. An examination of the investigation conducted by Emanuel Karlsten regarding e-mails sent between different accounts connected to the Public Health Agency, shows contacts and discussions done behind the scene, that might have been more suitable to be done in the open. The e-mails seem to have been sent in a semi-private discourse, although these are official e-mail accounts that can be requested for public access. It is plausible to argue that this kind of correspondence could be a sign of a barrier between public and authorities and lead to a greater distance between these to groups. But still, since the e-mails have been published by a journalist, there is an effort to bridge this gap.

The tendencies we see in Wong's article is actually more problematic from the view of Mouffe's theory. Here we have the public, in its desperation over disease and being locked down in their own home, writing to the government. But the words they use are words of anger and considered as threats – although this is disputed by others. In this case we can use Chantal Mouffes idea regarding *Einverstand* and *Einstimmung* – two different ways of communication and reasoning. In the Government Agency's idea of proper communication we have can see a foundation of *Einverstand*, rational and logic reasoning. Anger and desperation have no place here – you are supposed to argue using rationality. But the people does not have any possibility to be laid back and use logic. They are united in *Einstimmung* a fusion of voices not logically but emotionally connected. A government employee might use a criteria of utility, arguing that we have to close restaurants to get a grip of a vicious pandemic. Believing that life is weighted against pleasure. But for the restaurant owner who looses his possibility to earn a living – and his employees that cannot find work – for them the weighting is rather life against life.

Turning to Habermas and the development of modern administration there are some interesting aspects that need to be noticed. If we claim that administration develops over time, changing due to other changes in society, we could use this to analyze the supposed increase in questions to the Public Health Agency during 2020. The high pressure put on the agency from the public, with the administrations reaction creating ad hoc routines to counter the sudden increase of contact, could be explained as a change in the foundation of governmental work. Showing that old routines does not work under the new circumstances. The older order of administration were suited for a different society with a less intense communication level. People today have a higher communication need and are used to finding information, and being informed, much faster than earlier. This could lead to stress when the agency cannot fulfill the need of the public to be informed. From Habermas we have the notion that public sector administration have changed over time from more private (concerning the individual in power) to a more general public administration. The change that has happened during the end of the 20th century and forwards, with an information society in which the inhabitants are used to a faster and more efficient communication is a similar change. Better communication and better information management could lead to a lesser need for individual communication with the public agencies.

CONCLUSIONS; IMPLEMENTING A MODERN INFORMATION MANAGEMENT

One plausible explanation for both the problems described by the journalist in the articles I have investigated and for the large amount of questions from the public is that there are need for a revised information management to cope with an increased request for information due to crisis. I will describe this need using three themes that are visible in the investigation and analysis above.

The first theme can be described as “Right information and communication in the right place”. To speculate regarding sensitive questions using an e-mail address belonging to your employer, an employer that is a part of the public sector, thus making the e-mails possible for public access, during a time of crisis, should be perceived as a problematic behavior. Communication that has a possibility to become public should be performed as if it is public from the beginning. Especially in a time of crisis when every word that the responsible agency communicates is weighted

carefully by the public. In the investigation the e-mails from the consultant Johan Giesecke discussed in the article by journalist Emanuel Karlsten is a prominent example of a need to be more distinct in governmental communications. Regarding the e-mails to the Public Health Agency from the public, it is possible that many questions from the public actually could have been answered through the official web page, if they continuously used a lessons learned method in which common questions where picked up and answered through the official channels. Of course this is a complicated process, but the possibility to lower the amount of personal communication should be used, both for sake of the administrations efficiency, but also to create a better way of communicating with the public.

The second theme can be described as a call to transparency. It overlaps to some extent with the previous theme. Transparency consist of two parts: Knowledge of being transparent – which was discussed briefly above regarding the Giesecke-case. In a sensitive situation, as a pandemic, messages that can be released to the public should be clear and easy for the public to interpret. The main goal should be to not produce unclear and nontransparent information in any channel that can be accessed by the public. A strategy to counter misunderstandings and conspiracy theories. The other part of transparency is to actually be transparent. In this case, with an agency in a nation with a long tradition of transparency, to follow the law, and have systems at hand that facilitates transparency. The extreme case of non-transparency is when internal information is destroyed by an agency. Destruction can be destructive for transparency in at least two ways – destroying the possibility to use the information for research or assessment is one – the other is the risk of giving the impression that you are hiding something. The second one must be seen as very problematic during a global pandemic.

The third theme is “right classification”. The need for right classification becomes evident in the article by Ola Wong, where a numbers of e-mails perceived as threatening by clerks at the Public Health Agency, were classified as non-threatening by professionals who analyzed the e-mails. It is, especially during a period of high levels of information flow, important to have a sensitive system of information classification, not causing alarm when there actually is not threat.

Otherwise there are possibilities of a misuse of resources and confusion among the media and the public.

In the end, it is difficult to interpret if the Public Health Agency did a good job in managing their information or not. There are few possibilities to compare their work to other agencies – The pandemic being such an unique situation. The pandemic is not over yet making it impossible to assess it as a whole. Maybe a comparison will be possible in the future when this crisis can be compared to other crisis. Not being too much of an optimist and believing there will be troubles in the future too.

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OPEN ACCESS INITIATIVE: A GATEWAY FOR KNOWLEDGE MANAGEMENT IN THE 4TH INDUSTRIAL REVOLUTION AND COVID-19 ERA

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Abstract
Open Access initiative is helping to remove the major obstacles to accessing, sharing, and using the outputs of scholarly research; thus, providing a way for knowledge management in the 4th Industrial Revolution and Covid-19 era. This paper presents the preliminary results of a study on the awareness of open access resources and their adoption and use for teaching, research, and publication by academics in selected tertiary institutions in Oyo State, Nigeria. The study also examined the influence of the use of open access resources on knowledge sharing behaviours of academics. Findings revealed a high level of awareness of open access among academics. There is also a high level of use of open access resources for teaching and research and also for publication among academics. The study identified some factors that influenced the use of open access resources by the academics, and found a positive correlation and significant relationship between the use of open access resources and knowledge sharing behaviours of the academics. The paper makes some recommendations towards the increased availability of open access resources as well as the promotion of the use of open access resources for scholarly communication among academics. The findings present theoretical, societal, and methodological significance to all stakeholders.

Keywords: *Academics in Nigeria, Creative Commons licenses, Knowledge sharing behaviour, Open access resources.*

INTRODUCTION

In an academic environment, the importance of research cannot be overemphasised. Academics fulfill their responsibility of producing scientific knowledge through research and scholarly publications (Turgut, Aslan, & Denizalp, 2021); hence, they depend on scholarly resources to meet their information requirements. The emergence of the Internet, which has made the world a global village, has caused a massive transformation in many phases of life, including scientific journal publishing. Prior to this, access to scientific publications was in a print mode that could only be accessed through subscription, but there is now a shift from print-only journals to parallel print and electronic publishing, and then Open Access (OA) publishing. Before the emergence of the open access initiative, researchers, who are the producer, controllers, and consumers of knowledge, always purchased scholarly publications they need, while contributing to knowledge. This was considered an anomaly, which led to the campaign for, and promotion

of, open access. The concept “open access” was introduced into electronic publishing to compliment the closed or subscription-based resources, providing unhindered access to information and knowledge to users free of charge. OA grants access to publications without any barriers imposed by toll access or subscriptions (Tise & Raju, 2015; Tenopir, King, Edwards, & Wu, 2009), and help provide free flow of information and knowledge, which is fundamental to bridging the knowledge gaps between the privileged and underprivileged communities.

Open access is growing across the globe due to increased global access to the Internet and the activities of OA promoters (Bashorun, Jain, Sebina, & Kalusopa, 2016; Dulle, Minish-Majanja, & Cloete, 2010; Jain, 2012). OA provides the impetus for the accelerated growth of knowledge societies as social inclusion and economic empowerment are achievable in a society where the citizens have unhindered access to information and knowledge. According to Budapest Open Access Initiatives (2002), Open Access “means free availability on the public Internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the Internet itself” (p.2). Harnad (2011) describes the characteristics of OA as the information which is free, immediate, permanent, full-text, online, and accessible. The Berlin Declaration of Open Access (2003) describes open access contributions to include “original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material”. Open access provides a synergy for knowledge management because the fundamental principle of open access is the distribution of information and knowledge to the widest possible audience with absolute minimum financial hurdles.

Open access has many benefits and opportunities, not for scholars only but also for readers, universities, government agencies, the general public, and other stakeholders in the education sector. The primary advantage of OA journals is that the entire content is available to users everywhere regardless of affiliation with a subscribing library. Open access helps to remove the major obstacles to accessing, sharing, and re-using the outputs of scholarly research; thus,

promoting accessibility and visibility of research findings (Bashorun et al., 2016; Turgut et al., 2021). Also, OA articles are immediately recognised and cited than closed access articles published in the same journal, thus, helping enrich both academics and universities' profiles, which invariably help increase the webometric ranking of the university of the scholar. OA also helps to easily and quickly disseminate research findings, as new ideas can be dispersed more rapidly and widely, which in turn triggers new research studies, and serves as an impetus for knowledge. Publishing in OA increases interdisciplinary conversation and publications, which foster greater dialogue across discipline boundaries, helping to find novel approaches to traditional problems (Jain, 2012; Nwagwu, 2013; Sheikh, 2019). Also, open access to data may increase confidence in results reported in an article and therefore, lead more subsequent authors to be willing to rely on that article in their work. More importantly, OA helps bridge the digital gap between developed and developing countries in terms of the availability and accessibility of resources. In the past, many universities in developing countries could not afford to subscribe to closed resources; however, OA is helping to make research outputs available to users in the developing and less developed world, thereby bridging the information and knowledge divide.

Open access is thus, a humanitarian movement that aims to ensure equal access to knowledge for every member of the society (Shuva & Taisir, 2016). However, despite the many advantages of OA, research has shown that some scholars are not aware of what is available to them and what the services are capable of doing. This is attributable to a lack of knowledge of the existence of OA journals, inadequate skills to navigate the Internet, unstable power supply, unavailability of Internet facilities, the permanence of OA movement due to unstable financial support, among others. Also, there are debates about the quality of OA publications and the danger of making erroneous scientific publications 'open access'. For example, the emergence of predatory journal publishers that charge authors for their publication without subjecting such papers to quality peer-review, copy-editing, and indexing services is one major negative aspect that generates many misconceptions about OA, and which is spoiling the reputation of OA publications (Beall, 2012, 2015; Berger & Cirasella, 2015). However, because OA initiatives provide an opportunity for wide dissemination of research findings particularly in the developing countries, coupled with the fact that adoption of OA scholarly communication has been an issue of great concern

among scholars in Nigeria (Ezema, 2013; Nwagwu, 2013), there is the need to conduct a study to examine OA awareness and use among university scholars in Nigeria, Therefore, this study was designed to investigate the level of awareness of OA, the factors that influence use, the challenges encountered, as well as the influence of the use of Open access resources (OAR) on knowledge sharing behaviour of lecturers in selected tertiary universities in Oyo state, Nigeria. The study answered the following research questions:

i. Are lecturers in selected universities in Oyo state, Nigeria aware of OA?
ii. What is the level of use of OAR by lecturers in selected universities in Oyo state, Nigeria?
iii. What factors influence the use of OAR by lecturers in selected universities in Oyo state, Nigeria?
iv. What are the challenges faced by the lecturers while using OAR?
v. Do the lecturers in the selected universities share knowledge?
vi. Do the attitudes of the lecturers towards OA influence their knowledge sharing behaviour?
vii. Is there a significant relationship between the use of OAR and knowledge sharing behaviours of the lecturers?

LITERATURE REVIEW

Open access has attracted debate among scholars and other stakeholders of electronic journal publishing such as publishers and users of open access; hence, several studies have been conducted to understand and investigate the awareness and use of OAR. Considering the huge volume of research on OA and its related areas, the literature review of this study was intentionally confined to literature that discussed the perceptions and use of OAR, mostly by academics and authors, as well as the factors that influence use. Swan and Brown (2004) conducted the first study regarding authors' awareness about OAR. The study served as a benchmark for subsequent studies on OA. The results revealed that, whereas the awareness level of authors was quite high about OA journals, awareness about self-archiving was relatively low. The most dominant factors for authors to publish in OA journals were the principles of free access for all readers, faster publication times, large readership, and frequent citations. On the other hand, unfamiliarity, low impact, low prestige, and small readership were identified as

major factors for not publishing in OA journals. After Swan and Brown's study, several other studies have been carried out to investigate the use of OAR among academics; and these studies have reported diverse findings. For instance, Nicholas, Huntington, and Rowlands (2005) reported the views and experiences of nearly 4000 senior authors regarding OA publishing. The study found a "general ignorance of OA publishing on the part of relatively senior scholarly authors and highlights the importance of educational campaign to bridge the knowledge gap between authors and OA publishers" (p. 515). Also, Schroter and Tite (2006) assessed journal authors' knowledge and perceptions of OA and author-pays publishing. Half (54%) of the respondents thought OA had 'no impact' or had 'low priority' in their submission decisions, while two-thirds of the respondents indicated that they would prefer to submit articles to non-OA subscription journals than author-pay OA journals. Fullard (2007) investigated the awareness, concerns, and depth of support for OA amongst local researchers, research managers, and policymakers in South Africa. Fullard concluded that there was little prospect that academics would choose to publish within OA journals.

However, the findings of several other studies have disputed the conclusion of Fullard (2007). For instance, Warlick and Vaughan (2007) conducted semi-structured interviews with 14 biomedical faculty members at the University of North Carolina at Chapel Hill and Duke University, Durham, North Carolina. The interviews focused on faculty identified as early adopters of OA/free full-text publishing. The interviews attempted to determine whether the authors were aware they published in OA journals, why they chose to publish in OA journals, what factors influenced their publishing decisions, and their general attitude towards OA publishing models. Thirteen out of the 14 authors interviewed possessed positive attitudes towards OA publishing. Several other studies have also investigated the use of OA by academics. Some studies for example, (Bala, Bansal, & Sharma, 2018; Baro & Eze, 2017; Dulle et al., 2010; Gul et al., 2010; Kaba & Said, 2015; Lwoga, 2013; Rodriguez, 2014; Shuva & Taisir, 2016; Sheikh, 2019; Turgut et al., 2021; Sultan & Rafiq, 2021) found a high-level awareness and use of OA. While other studies (e.g., Hahn & Wyatt, 2014; Joicy & Ally sornam, 2019; Rodriguez, 2014; Yang & Li, 2015) found low awareness and use of OA publications. This variance in

findings calls for more research on investigating the awareness and use of OA among academics, thus this research.

Moreover, studies have also reported various factors influencing the use of OAR. Motivational factors (intrinsic and extrinsic came top), was found by most studies (e.g., Baro & Eze, 2017; Gul et al., 2010; Kaba & Said, 2015; Shuva & Taisir, 2016; Warlick & Vaughan, 2007) as the dominant factor influencing the use of OAR. The major motivational factors identified by researchers include: impact factor, speedy publication, free access to articles for users, large readership, increased research impact, prestige (Warlick & Vaughan, 2007), the proper peer review process, and high-quality editorial practices (Shuva & Tasir, 2016), the credibility of open access journals (Rodriguez (2014), reputation and impact factor of journal (Baro & Eze, 2017; Harnad, 2011), content is made freely available, quality/prestige, impact factor, no fees, speed of publishing, and publishers' reputations (Harnad, 2011), fast publication, increase productivity, and increase of citation paper (Gul et al. 2010), among others. These findings called for more investigation on some other factors that could influence the use of OA, which this study considered. Hence, this study included awareness, attitude to OA, subjective norms, and facilitating conditions, along with motivation, as some of the factors that could influence the use of OAR by academics in Nigeria.

METHODOLOGY

The study employed the descriptive survey research design. The location of study is Oyo State, southwestern, Nigeria. The study population consisted of lecturers in three selected universities in the state, which were purposively chosen based on ownership structure. The universities are the University of Ibadan (Federal), First Technical University, Ibadan (State), and Ajayi Crowther University (Private). The total population size of all lecturers in the universities is 1721 (UI = 1495; FTU = 100, and CU = 126) (UI Academic Planning Unit, 2021; FTU Academic Planning Unit, 2021; ACU Academic planning Unit, 2021). Using the formula of Dillman (2007) and the Raosoft Sample size calculator (Raosoft Inc., 2004), the recommended sample size is 315. However, disproportionate stratified sampling was used to select 376 respondents (10% of the total population in UI (150), and total enumeration of the population in FTU (=100) and ACU (=126).

Instruments for data collection

A questionnaire was used as the data collection instrument. The questionnaire, which consisted of five sections, was self-constructed and also adapted some items from past studies. The instrument, which contained 50 items, collected data on the respondents' demographics, use of OAR, factors influencing the use of OAR, challenges of using open access, and knowledge sharing behaviour of the respondents. The response format ranged from 1(not sure) to 5 (Strongly agree). The instrument was subjected to both face and content validity as it was given to two lecturers for scrutiny. Their suggestions and amendments were incorporated into the final instrument. The instrument was pre-tested for reliability (internal consistency) by lecturers in a different University (Lead City University, Ibadan) from the ones selected for the study. Cronbach alpha analysis was carried out to get the reliability coefficients for the constructs, which were all above the accepted 0.7, except two which were less than 0.7 as shown in Table 1.

Table 1: Cronbach alpha results for the variables

Variables	**Number of Measurement items**	**Cronbach Alpha Results**
Use of open access	4	0.694
Awareness	5	0.706
Attitude	5	0.728
Subjective norms	5	0.752
Facilitating conditions	5	0.702
Motivation (Intrinsic & Extrinsic)	7	0.623
Knowledge Sharing behaviour	4	0.702

Three hundred and seventy six copies of the questionnaire were administered with the help of three research assistants. The participants were reached through convenience and snowball sampling. However, it was a tedious task as most of the lecturers were not available on the first visit. Several repeat visits had to be made before a substantial number could be retrieved. Many of the lecturers did not fill the instrument immediately despite the effort made by the researcher not to make the instrument voluminous, just two pages. Some even misplaced the instrument; hence, new copies had to be given. After six weeks of repeated visits, 123 copies of the instrument were retrieved and all were properly filled and used for analysis, giving a 32.7%

response rate. Descriptive statistics (frequency count, mean and standard deviation) and Spearman correlation were used to analyse the data.

RESULTS AND DISCUSSION

Demographic description of respondents

Sixty five (52.8%) respondents were from UI, 31(25.2%) from FTU, and 27 (22.0%) from ACU. Most (52.0%) were males, within the age range 41-50 years (47.2%), and were in the Science and Technology discipline (46.3%).

Awareness of OA

All the lecturers sampled (100.0%) were aware of OA. This finding conforms with the findings of previous studies such as e.g., Baro and Eze (2017), Emojorho, Oghenetega, & Onoriode, 2012; Sheikh (2019), Turgut et al. (2021), and Sultan and Rafiq (2021) which also found a high level of awareness of OA among academics. For instance, Sheikh (2019) found that the majority of Pakistani faculty members (71.5%) were aware of the scholarly open access. Turgut et al. (2021) also found that 75% of Turkish academics had open access awareness and that their awareness was generally created by information that they obtained through the Internet and their friends.

Level of use of OAR

All the respondents declared that they used OAR. Most (43.9%) had published between 6-10 articles in OA journals, and most (93.5%) sent between 1-5 articles for publication in OA in a year as shown in Table 2. The results in Table 3 also reveal the agreement of the lecturers showing a high level of use of OA. The item "I use OA publications for my lectures and research" had the highest mean score (4.43). This finding also supports the findings of previous studies such, as Bala et al. (2018), Sheikh (2019), and Turgut et al. (2021) which also found a high level of use of OA among academics.

Table 2: Frequency and percentage distribution of the use of OAR (N=123)

	Frequency	Percent (%)
Number of Articles Published as Open Access		
1-5	30	24.4

6-10	54	43.9
11-15	20	16.3
16-20	9	7.3
Above 20	10	8.1
The average number of articles sent to Open Access Journal in a year		
1-5	115	93.5
6-10	4	3.3
11-15	2	1.6
Above 20	1	0.8
Missing System	1	0.8

Table 3: Frequency and percentage distribution of agreement with the use of OAR

Use of Open Access	NS Freq/%	SD Freq/%	D Freq/%	A Freq/%	SA Freq/%	Mean	Std. D
I use open access publications for my lectures and research	0	0	1 (0.8)	69 (56.1)	53 (43.1)	4.43	0.512
I have published in open access journals	0	0	0	71 (57.7)	52 (42.3)	4.42	0.496
I use open access publications very often	0	1 (0.8)	3 (2.4)	68 (55.3)	51 (41.5)	4.37	0.578
I give open access publications priority when deciding on where to publish	0	6 (4.9)	17 (13.8)	60 (48.8)	40 (32.5)	4.09	0.810

Legend: Not sure (NS), Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA)

Factors influencing the use of OAR

The factors that could influence the use of OAR were identified as awareness, attitude, subjective norms, facilitation conditions, and motivation. Table 4 presents the responses of the lecturers. The results show that all the lecturers (100.0%) were aware of OA, which influenced their use. The lecturers also had good and favourable attitudes toward the use of OAR as most agreed that publishing in OA journals is good for their research and career progression (mean score = 4.46). Also, the use of OA by most of the lecturers was influenced by their subjective norms, mainly "*the wide acceptability and use of OA by other researchers*" (mean score = 4.33). The lecturers also agreed to the influence of some facilitating conditions on their use of OAR, such as having the required skill (mean score = 4.28), the ease of accessing and using OA (mean

score = 4.24), availability of Internet access, computers, and technical support (mean score = 4.17)., as well as funding to pay for OA publication fees (mean score = 4.11). Most of the lecturers were also motivated to use OAR by both intrinsic and extrinsic motivations. Intrinsic motivation (*Publishing my works in open access increases my visibility and gives me recognition in my field/discipline and the research community*) ranked top (mean score = 4.33). These findings support the findings of previous studies (e.g., Bashorun et al., 2016; Emojorho et al., 2012; Joicy and Ally sornam, 2019; Shuva & Taisir, 2016; Turgut et al., 2021), which also identified the influence of awareness, attitude, subjective norms, facilitating conditions as factors that influence the use of OAR by lecturers in selected universities in Oyo state, Nigeria.

Table 4: Factors influencing the use of OAR

Factors	NS Freq /%	SD Freq /%	D Freq /%	A Freq /%	SA Freq /%	Mean	Std. D
Awareness of open access							
I am aware open access means free access to online publications	0	0	0	72 (58.5)	51 (41.5)	4.41	0.495
I have heard about open access journals	0	0	0	72 (58.5)	51 (41.5)	4.41	0.495
I know a lot about open access publications	0	0	2 (1.6)	70 (56.9)	51 (41.5)	4.40	0.524
I am aware of open access	0	0	0	73 (59.3)	50 (40.7)	4.40	0.508
I am aware of the Budapest Open Access Initiative (BOAI)	15 (12.2)	8 (6.5)	24 (19.5)	43 (35.0)	33 (26.8)	3.58	1.287
Attitude towards the use of open access							
Publishing in open access journal is good for my research and career progression	0	0	0	67 (54.4)	56 (45.5)	4.46	0.500
My usage of open access publications for research is a wise decision	0	0	1 (0.8)	67 (54.5)	55 (44.7)	4.44	0.514
I believe open access is a good idea.	0	0	0	70 (56.9)	53 (43.1)	4.43	0.497

I believe the use of open access publications is beneficial to me	0	0	1 (0.8)	69 (56.1)	53 (43.1)	4.42	0.512
Using open access publications is a wise idea.	0	0	1 (0.8)	70 (56.9)	52 (42.3)	4.41	0.511
Subjective norms							
The wide acceptability and use of open access by researchers influenced my use also	0	0	2 (1.6)	79 (64.2)	42 (34.1)	4.33	0.504
Many of my colleagues use open access publications	5 (4.1)	1 (0.38)	10 (8.1)	66 (53.7)	41 (33.3)	4.11	0.898
My institution encourages my use of open access publications	2 (1.6)	1 (0.8)	26 (21.1)	65 (52.8)	29 (23.6)	3.96	0.793
My friends encourage me to use open access	1 (0.8)	0	34 (27.6)	60 (48.8)	28 (22.8)	3.93	0.759
My usage of open access publications was encouraged by my mentor(s)	0	7 (5.7)	40 (32.5)	48 (39.0)	28 (22.8)	3.79	0.861
Facilitating conditions							
I have the skills required to use open access publications	0	0	0	89 (72.4)	34 (27.6)	4.28	0.449
The ease of accessing and using and publishing in open access encourages me to use it		2 (1.6)	1 (0.8)	85 (69.1)	35 (28.5)	4.24	0.548
I have the necessary resources (Internet access, computers, technical support, etc.) needed to use open access publications	0	1 (0.8)	10 (8.1)	79 (64.2)	33 (26.8)	4.17	0.597
Availability of Internet access in my institution and home facilitate my use of open access publications	0	1 (0.8)	12 (9.8)	76 (61.8)	34 (27.6)	4.16	0.619
Availability of funding determines my use of open access for publication	0	3 (2.4)	13 (10.6)	75 (61.0)	32 (26.0)	4.11	0.675
Motivation (Intrinsic and Extrinsic)							
Publishing my works in open access increases my visibility and gives me recognition in my field/discipline and the research community.	0	0	1 (0.8)	80 (65.0)	42 (34.1)	4.33	0.490
Publishing in open access helps other scholars have access to the literature they	0	0	1 (0.8)	82 (66.7	40 (32.5	4.32	0.484

may not have access to in closed journals.				)	)		
I derive satisfaction in publishing my work where others could benefit from it.	0	0	1 (0.8)	83 (67.5)	39 (31.7)	4.31	0.48 1
I enjoy helping others which prompts me to publish my papers where others could have easy access.	0	0	1 (0.8)	83 (67.5)	39 (31.7)	4.31	0.48 1
Works published as open access gets more citations than those published in subscription journals.	0	0	1 (0.8)	83 (67.5)	39 (31.7)	4.31	0.48 1
Publishing in open access help other researchers build on my research findings.	0	0	1 (0.8)	85 (69.1)	37 (30.1)	4.29	0.47 4
Publishing in open access increases my chances of promotion because my institution recognises publication in open access for promotion.	3 (2.4)	5 (4.1)	29 (23.6)	58 (47.2)	28 (22.8)	3.84	0.90 9

Challenges of the use of OAR

Some challenges of the use of OAR were identified. Table 5 presents the analysis of the responses. The most ranked challenge is "plagiarism, copyright and intellectual property right issues associated with open access publications" (mean score = 3.75). However, most (65.8%) disagreed that "*lack or cost of resources needed to use (computer, Internet access, electricity, etc.)* is a challenge. Most (73.1%) also disagreed that the peer review process for open access publications is not thorough and that the impact factors of open access journals are low (74.0%). Likewise, a majority (74.8%) disagreed that open access publications are not considered as prestigious as traditional journals, while 76.4% disagreed that the quality of publications in open access journals is not as high as the traditional journals. This implies that the lecturers were favourably disposed to the use of OAR. These results support the findings of previous studies (e.g., Emojorho et al., 2012; Joicy and Ally sornam, 2019; Lwoga, 2013; Sheikh, 2019), which had also identified some of these challenges.

Table 5: Challenges faced while using OAR								
Challenges	NS Freq/ %	SD Freq/ %	D Freq/ %	A Freq/ %	SA Freq/ %	Missin g value	Mea n	Std. D
Plagiarism, copyright and intellectual property right issues	3 (2.4)	5 (4.1)	22 (17.9)	82 (66.7)	11 (8.9)	0	3.75	0.772

associated with open access publications								
Processing fee for open access journal is high	2 (1.6)	8 (6.5)	48 (39.0)	57 (46.3)	8 (6.5)	0	3.50	0.783
Lack or cost of resources needed to use (Computer, Internet access, electricity, etc.)	2 (1.6)	24 (19.5)	57 (46.3)	33 (26.8)	7 (5.7)	0	3.15	0.859
The peer review process for open access publications is not thorough	2 (1.6)	18 (14.6)	72 (58.5)	27 (22.0)	2 (1.6)	2 (1.6)	3.07	0.709
Impact factors of open access journals are low	2 (1.6)	22 (17.9)	69 (56.1)	26 (21.1)	3 (2.4)	1 (0.8)	3.05	0.748
Open access publications are not considered as prestigious as traditional journals	2 (1.6)	27 (22.0)	65 (52.8)	27 (22.0)	2 (1.6)	0	3.00	0.757
The quality of publications in open access journals are not as high as the traditional journals	3 (2.4)	25 (20.3)	69 (56.1)	24 (19.5)	2 (1.6)	0	2.98	0.752
Others (please specify) ……	0	0	0	0	0	0		

Knowledge sharing behaviour (KSB)

Findings, as revealed in Table 6, show that the lecturers engaged in knowledge sharing. Most agreed to all the items used to measure KSB. The item "I voluntarily share resources that I know could be of benefit to my colleagues" had the highest mean score (4.39).

Table 6: Knowledge sharing behaviour of the lecturers

Knowledge Sharing Behaviour Items	NS Freq/%	SD Freq/%	D Freq/%	A Freq/%	SA Freq/%	Mean	Std. D
I voluntarily share resources that I know could be of benefit to my colleagues.	0	0	0	75 (61.0)	48 (39.0)	4.39	0.490
I usually involve myself in professional discussions that will benefit my colleagues.	0	0	0	76 (61.8)	47 (38.2)	4.38	0.488
I discuss professional problems encountered in the course of my work with others rather than struggle with it alone.	0	0	1 (0.8)	76 (61.8)	46 (37.4)	4.37	0.500
I enjoy sharing knowledge with my colleagues	0	0	1 (0.8)	71 (57.7)	51 (41.5)	4.41	0.510

Influence of attitude towards OA, and use of OAR, on KSB of lecturers

The influence of attitude and use of OAR on KSB was tested by formulating two hypotheses. Spearman's rank-order correlation test was used to determine the relationships.

Hypothesis 1:

There is a significant relationship between attitude towards open access and knowledge sharing behaviour of lecturers in selected tertiary institutions in Oyo state, Nigeria.

A Spearman's rank-order correlation was run to determine the relationships between the attitudes of the lecturers towards OA and their KSB and the results are presented in Table 7. There was a weak, positive correlation between attitude and KSB, which was statistically significant (r_s *=0.253, p=0.005<0.05*); the alternate hypothesis was not rejected. Therefore, it can be stated that the attitudes of the lecturers towards OA influenced their KSB. The results also showed that if there is an increase in the attitudes of the lecturers towards the use of OAR, they will engage more in knowledge sharing.

Table 7: Results of Spearman's rho correlation for the relationship between Attitude and KSB

			AttiOAP	KSBOAP
Spearman's rho	AttiOAP	Correlation Coefficient	1.000	.253**
		Sig. (2-tailed)	.	.005
		N	123	123
	KSBOAP	Correlation Coefficient	.253**	1.000
		Sig. (2-tailed)	.005	.
		N	123	123

**. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 2:

There is a significant relationship between the use of open access and knowledge sharing behaviour of lecturers in selected tertiary institutions in Oyo state, Nigeria.

The results in Table 8 show a weak, positive correlation between the use of OA and KSB, which was statistically significant ($r_s = 0.137$, $p = 0.032 < 0.05$); the hypothesis was accepted. Therefore, it can be stated that the use of OA by the lecturers influenced their KSB.

Table 8: Results of spearman's rho correlation for the relationship between use of OAR and KSB

			UseOAP	KSBOAP
Spearman's rho	UseOAP	Correlation Coefficient	1.000	.137
		Sig. (2-tailed)	.	.032
		N	123	123
	KSBOAP	Correlation Coefficient	.137	1.000
		Sig. (2-tailed)	.032	.
		N	123	123

CONCLUSION AND RECOMMENDATIONS

The study concluded that there was a high level of awareness and use of OAR by lecturers in the University of Ibadan, First Technical University, Ibadan, and Ajayi Crowther University, Oyo. The use of OAR by the lecturers was influenced by awareness, attitude, subjective norms, facilitating conditions, and motivations. The major challenges faced while using OAR included plagiarism, copyright and intellectual property right issues associated with OAR, high publication fees for open access, among others. Findings also revealed a positive correlation and significant relationship between the attitudes of the lecturers towards OA, use of OAR, and knowledge sharing behaviours. This implies that if there is an increase in creating awareness and promoting the use of OA among academics, there would be more usage, collaboration, and knowledge sharing.

The outcome of this study contributes to providing a ground for discussion on the advantage of OA as an alternative mode of scholarly communication in a developing country like Nigeria. Findings from this study would be useful to university scholars, university management, and other stakeholders such as libraries. The study would also serve as an addition to practical

knowledge for researchers, particularly on the adoption of the OA initiative. It is recommended that universities should give more recognition to the promotion of the use of OAR for research and development, as this would help give more visibility to the lecturers which invariably helps increase the webometric ranking of universities. Efforts should also be geared towards having an OA usage policy to guide against the use of predatory journals. which are mainly published as OA.

LIMITATION OF THE STUDY

The findings and conclusion from this paper are subjected to some limitations. The population of the study is restricted to lecturers in just three universities in Nigeria. Also, the sample size and the response rate are small, making the findings not generalisable. However, the study is ongoing as more data will be collected, while future studies would be extended to other universities in Nigeria.

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AN INSTITUTIONAL THEORY PERSPECTIVE OF E-GOVERNMENT IMPLEMENTATION IN BOTSWANA: THE CASE OF TLOKWENG LAND BOARD

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Abstract

Governments globally have fervently implemented eGovernment initiatives in efforts to further their digital transformation agendas toward more sustainable and resilient societies. Recently, Global South countries have been making efforts to profit from this phenomenon in their service delivery value chains which have become a pivotal socio-economic artefact in the digital economy. The government of Botswana through its wholistic public sector transformation plan has placed eGovernment implementation as a top priority. eGovernment initiatives in developing countries like Botswana are however not without challenges and generally high failure rates. One of the major challenges, as scholars agree, relates to institutional issues, particularly the institutionalisation change process that influences the routinisation of processes. Using the Institutional Theory as an analytical lens, this study explores the institutional forces that influence eGovernment systems implementation in Botswana taking the example of the Tlokweng Land board. Although Institutional Theory has been broadly applied in the literature to study the implementation of information systems, less attention has been given to the actual process through which institutional mechanisms bring about change after implementation in public sector organisations particularly in Global South contexts like Botswana. To address this gap in literature this paper explores the interplay between three specific concepts of the Institutional Theory being, Institutional Logics, Institutional Isomorphism, and Institutional Entrepreneurs in the implementation of eGovernment systems in Tlokweng Land board in Botswana. The basis of data collection for this paper includes semi-structured interviews and a review of literature and document analysis based on Tlokweng Land board (of eGovernment implementation in Botswana). The findings of this study reveal that all three isomorphic pressures had a significant influence on the implementation of eGovernment at Tlokweng Land Board. These findings indicate that Tlokweng Land Board must pay greater attention to the evolving institutional logics and understanding of prevailing institutional pressures existing in the organisation to ensure the successful implementation of eGovernment initiatives. Furthermore, the critical role of Institutional Entrepreneurs is further reiterated by this study particularly their leadership in resource mobilisation and leveraging process to ensure that the eGovernment system is institutionalised at Tlokweng Land Board.

Keywords: *Institutional Theory, eGovernment, Institutional Change, Developing Countries, Botswana, Tlokweng Land board*

1. INTRODUCTION

The ICT revolution has undeniably transformed all facets of modern society, presenting with it the promise of better access to information and knowledge, improved processes and better interactions with government organisations to name a few (Madon & Krishna, 2018). For Botswana, an upper-middle-income country this has presented a great opportunity for its

ambitious plans to transform from a mineral resource-based economy to a knowledge economy (Bwalya, 2012). As evidenced by different national transformation frameworks, from the Maitlamo National ICT Policy to the current vision 2036, the country's leadership has long recognised ICTs as an important apparatus in the diversification of the economy, but also an improvement tool for the numerous inefficiencies within government (Mosweu et al., 2017; Raboloko, 2019). One of these inefficiencies pertains to land administration and management which has been recognised as a major drawback for economic transformation and improved government service provision (Malatsi & Finnstrom, 2011).

Land constitutes the basis of economic development for any country, however, its proper administration can only be accomplished if there is efficient land information management (Government-of-Botswana, 2012). From as far as the early 2000s Land Boards have participated in the wider eGovernment computerisation project by the Ministry of Land Management, Water and Sanitation to optimise service availability and delivery, particularly on tribal land which constitutes more than 70% of the country (Mooketsi & Leonard, 2013).

The question that has been a quest for inquiry for many researchers and scholars alike is, can the mere implementation of ICTs be a panacea to this problem and if not, what could be the barriers to this? While the answers to these questions are not straightforward this paper seeks to look for them from the institutional perspective making use of the institutional theory framework as an analytical lens in the context of Tlokweng Land Board in Botswana. With the country embarking on a course of change into a knowledge-based economy institutional change in many government organisations that are implementing eGovernment initiatives, can be viewed as a precondition for the success of such initiatives (Avgerou, 2001; Mooketsi & Leonard, 2013). However, given the vast distinctiveness of each setting, the institutionalisation of eGovernment initiatives is bound to differ according to the context. For Tlokweng Land Board like many other land administration bodies in the Global South, issues of information asymmetry in land use, poor capacity building for staff, population increase, and instances of corrupt practices make implementation to be an arduous task (Mooketsi & Leonard, 2013). This often leads to a lack of institutionalisation which causes the failure of eGovernment initiatives (Wahid & Sein, 2014).

Against this backdrop of information at Tlokweng Land Board, this paper seeks to achieve the following objectives;

- To identify institutional mechanisms that influence eGovernment systems implementation.
- To explore the challenges faced in the implementation of eGovernment.
- To establish new insights institutional theory can offer into the challenges faced in the implementation of eGovernment.

The paper is arranged as follows: The first section of this study provides a background of the study and introduces key concepts and motivation for the study. Section 2 provides a description of the underlying concepts of institutional theory to assist with the study. Section 3 presents a brief review of the context and the research methods utilized to collect data for the study. In Section 4 the Case Study context is introduced, followed by an analysis and presentation of the findings in Section 5. Section 6 ends the paper with conclusions and recommendations for eGovernment implementation at Tlokweng Land Board.

2. INSTITUTIONAL THEORY (CONCEPTUAL FRAMEWORK)

To apply the Institutional Theory to Information Systems research in the public sector, for this context it is important to understand the meaning of an *"institution"*. The first meaning refers to organisations themselves and the second meaning as Scott (1995) asserts refers to *"complex, resilient social structures, composed of symbolic social arrangements, elements and material resources that have attained a particular property or state".* For the context of this paper latter meaning will suffice.

This paper is anchored on three distinctive institutional theory concepts namely: *Institutional Isomorphism* (DiMaggio & Powell, 1983), *Institutional logics* (Ocasio & Thornton, 1999) and *Institutional Entrepreneurs* (Wahid & Sein, 2014). These concepts will be briefly defined and introduced in the following paragraphs, but a detailed account will be applied to the Tlokweng Land Board case study in the findings chapter. The study explores the interplay between these mechanisms highlighting the role of the dominant entrepreneur(s) in the implementation of the system at Tlokweng Land Board (Shonhe & Grand, 2019; Bolaane & Kalabamu, 2013).

Institutional Isomorphism

While institutions exist to advance stability and order in organisations, they are subjected to incremental and revolutionary change (Scott, 1995). According to Teo et al. (2003), organisations face pressures from social structures of appropriate behaviours and the external environment to conform to common norms. Any contravention of these norms and social structures jeopardises the organisation's legitimacy, which may eventually impinge on its resource security and social support. However, even though this may be true, institutional theory views institutions as active participants with the capacity to respond innovatively to external pressure and not just as passive artefacts. In this way, organisations respond to external forces to adapt or to be *"isomorphic"* with their environments (DiMaggio&Powell, 1983; Weerakkody et al., 2009). There are three forms of institutional isomorphic changes identified in the literature reviewed which are discussed in this paper and these are normative, mimetic and coercive isomorphism (Scott, 1995; Wahid & Sein, 2014).

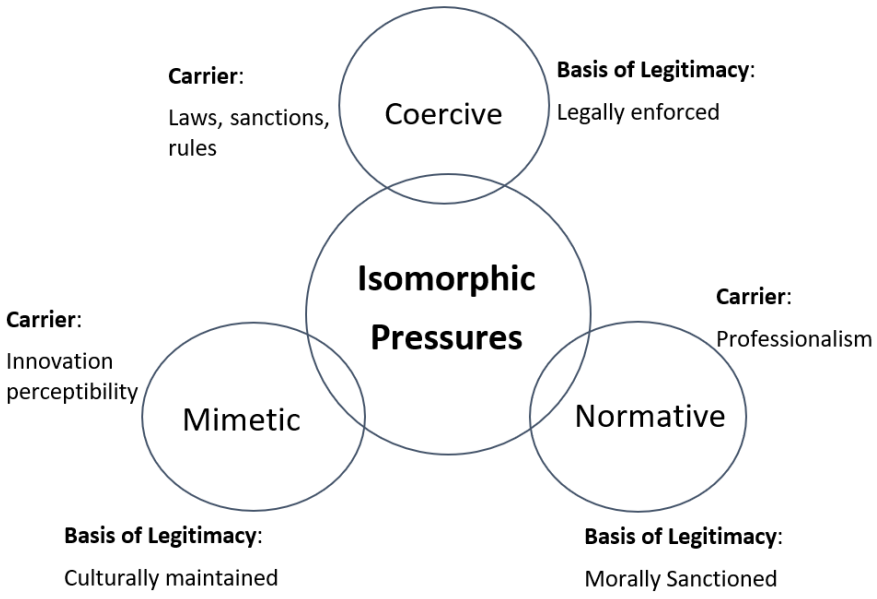
Normative Isomorphism is associated with professionalism and culture. For instance, regular communication between organisations could result in related philosophy, behaviours and learning (Teo et al., 2003). As the name suggests, the organisational norms in a particular field have a great influence on normative isomorphism (Wahid & Sein, 2014). To achieve legitimacy, therefore, organisations regularly need to maintain these norms.

Coercive Isomorphism, conversely, comes from political influence, which is a result of pressures applied on organisations by different institutions they are contingent on (Scott, 1995). These pressures can be enforced by funding organisations and national regulatory bodies, legitimacy is hence legally imposed (DiMaggio & Powell, 1983).

Mimetic Isomorphism happens when organisations respond to uncertainty by imitating or "mimicking" other organisations that have been effective in some features (Weerakkody et al., 2009). For instance, some public sector organisations in the global South implement eGovernment initiatives to mimic popular initiatives in developed countries (Wahid & Sein, 2014). Thus, legitimacy is culturally established, and ultimately, through an emulating process, organisations become similar (Kim et al., 2009; Scott, 1995).

In a nutshell, institutions confront several external forces in the quest to become organised and comparable, as shown in **figure 1** below**.** The overlapping circles symbolise the intersectant influence of the three mechanisms.

Figure 10 Institutional Isomorphism Pressures



Source: Adapted from DiMaggio and Powell (1983, p. 63)

As already stated, institutions are not just passive artefacts but rather deal with coercion from their background dynamically, therefore, one of the critiques of isomorphism is that its perspective is inadequate (Wahid & Sein, 2014). Furthermore, different actors perform a substantial role in influencing institutional norms and behaviours. This brings us to the next concept of institutional logic.

Institutional Logic

Institutional logics are defined as fundamental and symbolic values, patterns of rules and assumptions that are socially shaped by actors to generate and reproduce their material existence and to give value to their social reality (Ocasio & Thornton, 1999, p. 804). Furthermore, institutional logics offers an essential basis to explain the inherent beliefs and conflicting traditions in organisations. Primarily, they provide the vital link between socially fashioned

institutional practices and institutional actors' agency which is often neglected in IS research (Scott, 1995; Wahid & Sein, 2014).

Institutional Entrepreneurs

Institutional Entrepreneurs are instrumental agents that have political and social capabilities and resources at their disposal to steer and influence change (Dorado, 2005). These agents play a paramount role in maintaining the legitimacy of an organisation by supporting the development of appropriate institutional logics linked to their value system (Kim et al., 2009). In addition to the external forces, institutional entrepreneurs influence the institutionalisation process internally by utilising resource mobilisation plans and acquiring support from different stakeholders to execute their strategies (Dorado, 2005). From this vantage point, it can be argued that institutionalisation is a process that occurs when different groups of actors and agents inculcate values and create 'reality' through a common patterning of routine actions (Wahid & Sein, 2014).

3. RESEARCH METHODOLOGY

Since this paper seeks to establish an appreciation of the complexities in human activities, behaviours, and norms among various actors at Tlokweng Land Board, the methodology used for this paper is predominantly qualitative. The qualitative research method enabled a simple delineation of institutional factors to understand the perspective of their reality in the social world (Yin, 2009). Correspondingly, this aligns with the selection of the case study design because it allowed for the navigation of these aspects comprehensively.

The research approach was framed by following the (Creswell & Creswell, 2017)'s fundamental framework of organising research. The study employed the worldview of the institutional theory perspective that permits for a conceptually comprehensive basis to investigate the non-linear (in contrast to linear) route of eGovernment adoption and assimilation in Botswana, taking the Tlokweng Land Board as a case study. A single case study design as Yin (2009) suggests, is especially useful in exploratory and explanatory research because it enables the documentation and understanding of real-life contexts, particularly when the case under review is extreme or unique. The case of eGovernment implementation at Tlokweng Land Board is unique in that

according to the review of literature there is currently a few organisation-wide eGovernment systems in Botswana and the SADC region (except for South Africa and Mauritius) that have been significantly reported on.

According to (Creswell & Creswell, 2017), the third most significant part of the research design framework is the methods utilised for data collection, analysis and interpretation. A combination of secondary and primary data was utilised to systematically show proper insights and to compare diverse experiences in the study (Creswell & Creswell, 2017). For data collection, the study incorporated semi-structured interviews with a sample size of 10 interviewees. Other sources of data collection included archival records and documents comprised of Botswana eGovernment published policy and strategy reports, doctoral thesis from the University of Botswana and Botho University libraries, project reports from Ministry of Land Management, Water and Sanitation Services and statistics from other public sector organisations in Botswana.
The qualitative data was analysed using a deductive research approach and thematic analysis to identify common themes from both secondary and primary data that was collected. Themes developed from the institutional theory conceptual framework specifically institutional isomorphism concepts — normative, cultural cognitive and regulatory mechanisms including institutional logics were utilised as templates for the coding process. This exercise, albeit a subjective one, revealed many themes from the literature using theory and critical analysis. The research findings were then reviewed following the research questions and objectives presented in the introduction.

4. CASE STUDY

Tlokweng Land Board eGovernment initiative

There are 12 administrative Land Boards in Botswana which derive their decree from the Tribal Land Administration Act of 1968 and direct the management and administration of tribal land (Malatsi & Finnstrom, 2011). The Tlokweng Land Board like other Land Boards in Botswana falls under the Department of Land Board Services which is a branch of the Ministry of Land Management, Water and Sanitation Services charged with land administration, estate management and conveyancing matters for the tribal land (Shonhe & Grand, 2019). Situated in

the peri-urban village of Tlokweng and part of the capital city Gaborone's greater municipal area, Tlokweng is a fast-growing area. As a result, Tlokweng Land Board is one of the busiest owing to the greater need for commercial and residential land in the expanding city (Bolaane & Kalabamu, 2013; Shonhe & Grand, 2018).

Tlokweng Land Board, similar to other land boards in Botswana, has been confronted with different challenges in the management of tribal land (Baaitse, 2021; Mooketsi & Leonard, 2013). Several media reports have highlighted the public outcry of the instances of duplication of land titles and inappropriate land allocation registers which stems from inefficient land administration practices (Baaitse, 2021; Shonhe & Grand, 2019). In its effort to address these existing problems and a deluge of land records, the Land Board leadership adopted a Tribal Land Information Management System (TLIMS) that had a data capturing tool named Informate (Shonhe & Grand, 2018). Informate was especially effective in the compilation of spatial data to be populated into the TLIMS (Shonhe & Grand, 2019). The TLIMS was envisioned to integrate a variety of fundamental land records and information held by the land board such as land certificates, GIS positions on plots, paper file references, and national ID numbers, but its success was brief owing to capacity inadequacies against the backdrop of growing land applications from the public (Makhumalo, 2014).

As part of a ministerial initiative, the Improvement of Land Administration Procedures, Capacity and Systems (LAPCAS) was introduced (Malatsi & Finnstrom, 2011; Mosweu et al., 2017). LAPCAS is a partnership between the Swedish Government Mapping and Land Registration Authority (Lantmäteriet) and the Ministry of Land Management, Water and Sanitation Services (Malatsi & Finnstrom, 2011). LAPCAS was projected to improve the current land administration problems by building an integrated land information system that supports wide-ranging information about land tenures in Botswana (Bolaane & Kalabamu, 2013; Shonhe & Grand, 2018). LAPCAS has a Standardised Repository and Data Usage Tool (STARDUST), an online-based tool that has extensive functions for action officers at all Land Boards which was added to enhance the Informate module (Shonhe & Grand, 2019).

Historically contingent institutions at Tlokweng Land Board

An eGovernment project, like the TLIMS and LAPCAS initiatives, is a considerable change in an organisation like Tlokweng Land Board, not just in the introduction of ICTs or technology, but for the changing of established human norms and behaviours also (Weerakkody et al., 2009). As previously revealed in the review of institutional theory literature, transforming organisational and human behaviour necessitates confronting the institutional logics in which these norms and behaviours become recognised in organisations (Avgerou, 2001; Wahid & Sein, 2014). In the case of Tlokweng Land Board like many government organisations in Botswana, its foundations are rooted in strong traditional Setswana institutions like therisanyo (consultative leadership) and the kgotla system (democracy and collective action) (Seidler, 2010).

Traditionally through therisanyo (consultative leadership), a public consultation was done as an essential feature in the land administration process. The principles of this institution continue to be powerful tools for disorganisation, internally and externally in organisations if not done in the appropriate approach (Seidler, 2010). Inadequate consultative leadership can lead to the failure of projects. For instance, the Okavango water project failed to gain momentum as a result of opposition from the public who felt they were not 'consulted' and consequently rejected the development (Mokone et al., 2018). While implementing the LAPCAS initiative the leadership at Tlokweng Land Board was more mindful of these historically contingent institutions compared to when TLIMS was implemented and an internal task force team was formed to drive change (Malatsi & Finnstrom, 2011; Shonhe & Grand, 2018). The leadership work together with local chiefs and through the kgotla system (democracy and collective action) and participated in public discussions on the impacts the innovation will deliver (Malatsi & Finnstrom, 2011).

5. FINDINGS AND ANALYSIS

Data Presentation

The basis of data collection for this paper included semi-structured interviews and a review of literature and a document review based on Tlokweng Land board eGovernment implementation. Data were analysed and presented thematically, with themes drawn from the objectives of the study. Coding was used, where Respondents A, B, C, D, and E represented the LAPCAS team and management.

Institutionalisation process at Tlokweng Land Board

In the beginning, external normative isomorphic pressures from public expectations for improved service delivery were most dominant. Nevertheless, the institutional entrepreneurs mobilised to challenge these pressures by establishing internal normative isomorphism through Botswana traditional institutions like therisanyo (consultative leadership) and the kgotla system (democracy and collective action). This may have contributed to improved former inefficiencies in the old institutional logic by making the development of the LAPCAS eGovernment initiative more of an accepted norm compared to the TLIMS.

Collective entrepreneurship influenced the internal institutional isomorphism within the organisation, and resource mobilisation strategies were used to deinstitutionalise the old institutional logic that was condemned for its inefficiencies. According to Respondent A, this failed in the beginning with the TLIMS due to staff resistance and a lack of clear policies. However, through determination and leadership from the institutional entrepreneurs, the old logic was gradually modified with the introduction of the LAPCAS initiative, and it is slowly becoming institutionalised. This reiterates the vast literature on the critical role played by institutional entrepreneurs in the implementation of eGovernment systems (Shonhe & Grand, 2019; Dorado, 2005; Wahid & Sein, 2014; Weerakkody et al., 2009).

Normative mechanisms

Due to the many problems in land management and administration, this study found that Tlokweng Land Board like other organisations is slowly transforming to a more customer-centric and business-like approach changing from the traditional administrative perspective through the various implementation of eGovernment initiatives like the TLIMS and LAPCAS (Mokone et al., 2018; Mooketsi & Leonard, 2013; Shonhe & Grand, 2018).

This is seen to emerge from normative expectations by the growing internet users and citizens' demand for improved service delivery from the Land Board. According to (Scott, 1995), organisations normally implement practices that are regarded to be beneficial by the public, thus normative forces as in the case of Tlokweng Land Board.

Coercive mechanisms

According to the interviews with Respondent C, the introduction of the first eGovernment initiative, TLIMS at Tlokweng Land Board had considerable teething challenges of low adoption and usage from staff, mainly action officers and records managers. Various factors like lack of ICT training, inefficient processes, and fear of social embarrassment for the information systems emerged as some of the reasons for poor adoption. The collective institutional entrepreneurs including the board leadership (the board secretary and deputy) and LAPCAS coordinators enforced mandatory capacity building and study tours to ameliorate these challenges in the current LAPCAS initiative. Though the training needs are not at full capacity collective institutional entrepreneurship has used its resource mobilisation strategies and political authority and powers to create partnerships with local and international academic institutions for tailor-made courses (Malatsi &, 2011).

Mimetic mechanisms

According to (DiMaggio & Powell, 1983) mimetic mechanisms convey the tendency of organisations to mimic or emulate other, usually well established, similar organisations. The primary driving force for the implementation of the previous TLIMS and the current LAPCAS initiatives at Tlokweng Land Board was premised on the improvement of service delivery at the land board. However, efforts from institutional entrepreneurship for the integration of all land administration activities across the country's Land Boards through the LAPCAS initiative offered a benchmarking opportunity. The Swedish Mapping and Land Registration Authority (Lantmäteriet) provided field trips and expertise on utilising ICTs to modernise land administration and records. This proved to be significant because initially, the means of attaining the set objectives for land management and administration were still unclear. Therefore, benchmarking or simulating Lantmäteriet's processes to success turned out to be a convenient way to proceed since the organisation was recognised as legitimate.

Table 1 below provides a summary of the findings that show that different institutional mechanisms were at play in the implementation of the eGovernment initiative at Tlokweng Land Board.

Institutional Mechanisms	Implementation procedures	Basis of Legitimacy	Institutional Logics
Coercive	Public demand for better service delivery forced institutional entrepreneurs to implement eGovernment initiatives	Morally authorised based on shared values expressed by the Institutional Entrepreneurs	Improved service delivery (efficiency)
Normative	Mandatory use of the system enforced by the institutional entrepreneurs	Legally regulated through the organisation's policies and principles	Better processes
Mimetic	The project mimicked established and legitimate organisations for benchmarking	Culturally supported by embedding to the practices and hence being taken for granted	Sustained efficiency

Table 5 The relationship between the Institutional Mechanisms

6. CONCLUSIONS

In this concluding chapter, the study recapitulates the key findings and critically evaluates how these findings from the case study provide answers to the research questions that were initially intended to be resolved. Firstly, on what institutional mechanisms influence eGovernment systems implementation in Botswana using Tlokweng Land Board as a case study; and secondly what insights new institutional theory can offer into the challenges faced in the implementation of eGovernment. Recommendations for eGovernment policy will be identified and presented, and a critical examination of the limitations and suggestions for areas of improvement and future research for this study will be provided.

The findings of this study substantiated the critical importance of institutional entrepreneurs in the institutionalisation of eGovernment. The study identified how through the convening approach, collective institutional entrepreneurship composed of board leadership, LAPCAS

coordinators and local chiefs were formed. The study further identified that an eGovernment initiative can fail to institutionalise if sufficient impact is not drawn from the institutional entrepreneurs to use resource mobilisation strategies and their political authority to inculcate values and objectives as shown by the failure of the TLIMS eGovernment system which has since been discontinued. However, the other eGovernment system LAPCAS is showing great signs of being institutionalised at Tlokweng Land Board as its continuance is no longer dependent on coercive forces from leadership but instead is becoming normalised in the organisation, even though it is slower than expected.

While deinstitutionalisation of the old established institutional logics manifested in the case of Tlokweng Land Board is specific to the context, the deinstitutionalisation of established traditional and organisational logics is not a simple phenomenon and often not a straightforward process. Moreover, this reinforces the importance of staff capacity building and clear change management policy when implementing technology in an organisation.

The study shows the benefits of good institutional entrepreneurship from the board leaders in Tlokweng Land Board at the beginning of the eGovernment implementation by conceptualising institutional entrepreneurs and showing their role in mobilising resources and championing the transformation of institutional logics through traditional Setswana institutions like therisanyo (consultative leadership) and the kgotla system (democracy and collective action). However, more work is still required to create an environment where the need for the eGovernment system is considered an institutionalised norm which will yield many benefits in land and records management. Apart from the influencing and convening through normative mechanisms and instilling eGovernment change through regulative and coercive processes the study recommends that the institutional entrepreneurs impart models through mimetic influences, particularly in this era of 4IR. One of the main features of the 4IR is the uncomfortable pace of change it creates as emerging technologies generate new means of improving and delivering value in society. To benefit from emerging technologies whilst reducing their disruptive elements, Tlokweng Land Board needs to address the deficiencies in its institutional logics and governance structures like providing new training and capacity building in eGovernment systems as they evolve, securing

and managing land information and agile governance to be more resilient to institutional pressures and respond effectively to new technologies.

Although institutional theory indicates that institutional entrepreneurs exert their influence through different resource mobilisation strategies like leveraging and organising, it does not entirely explain the complex process of establishing a network necessary to achieve change. Therefore, in future studies applying concepts from the actor-network framework can improve our perspectives, for instance how institutional entrepreneurs make themselves an obligatory passage point and therefore steer the network. Lastly using the stakeholder theory—agency, power and legitimacy may shed more light on this phenomenon. Lastly, one limitation of this study was the use of a single case study. The successful application of a public system like the one evaluated at Tlokweng Land Board could be dependent on the context, thus, a single case study may not broadly illustrate likely alternatives for the success and reinforce the applicability of the findings in other scenarios. Future research should endeavour to perform this study in different government organisations and locations.

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