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Factors contributing to the successful development and use of mobile digital libraries: a systematic literature review

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Abstract

Purpose – The purpose of this paper is to review the literature on factors that contribute to the successful development and use of the mobile digital library (DL). This aim will be achieved by reviewing selected journal articles on mobile DLs' successful development and use. This paper argues that the concept of DLs is evolving because of the dynamic nature of knowledge and technological developments in the infosphere.

Design/methodology/approach – A systematic literature search of journal article factors that contribute to the successful development and use of the mobile DL was accomplished by searching the following databases: Emerald insight, Science directory and Google Scholar. The systematic review was conducted following the preferred reporting items for systematic reviews and meta-analyses guidelines. This study applied Rogers's (1965) Diffusion of innovation theory to unpack the attributes of innovation to unpack contextual factors shaping African conceptions of mobile libraries (m-libraries). The studies reviewed were published from 2016 to 2021. This paper is based on a systematic literature review. This paper uses publicly available literature on the theme of DLs concerning m-libraries. Among the search terms used for the study were: "digital libraries", "Africa and digital libraries", "electronic libraries", "information communication technologies", "access to information" and "mobile digital libraries".

Findings – Reviewed literature indicates that myriad factors can contribute positively or negatively to the successful development and use of the mobile DL. These factors include the degree of staff awareness and understanding of the potential of mobile technologies in enhancing the provision of library services, the availability of relevant digital content, library staff and users' level of digital and information literacy

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competencies to navigate digital platforms, user friendliness of DL platforms, material and financial support to access m-libraries, power supply and access to internet connectivity.

Practical implications – The results from this study will generate knowledge and insight into the factors that affect the development and optimal use of mobile DLs to enhance and widen access to scholarly databases irrespective of time and space. This study will make recommendations that will enable South African policymakers to make informed decisions relating to the factors affecting the development and usage of mobile DLs for enhanced learning, teaching and education.

Originality/value – Given the growing number of scholarly publications on mobile DLs, this study seeks to discover how such technologies can help enhance learning, teaching and research in higher education. This study's findings will provide a scientific basis for policymakers and researchers with evidence-based knowledge that raises the value of mobile DLs. It was discovered that if the identified factors are handled well, users can easily access tools, such as databases, electronic journals and online reference tools, and this could improve the quality of teaching and learning.

Keywords South Africa, Access to information, PRISMA, Mobile digital libraries, Mobile digital library development, Mobile digital library usage factors

Paper type Literature review

Introduction

Mobile libraries (m-libraries) have become a trendy global phenomenon in Higher Education Institutions, and Africa or developing countries are no exception. These digital libraries (DLs) accommodate the dynamic needs of users with access to mobile platforms, including mobile phones, personal digital assistants (PDAs) and other portable communication technologies. The concept of DLs can be traced to Bush and Licklider's (1965) observations on the need to identify and develop innovative technologies for knowledge sharing as a great leap forward to the drive towards technical progress (Candela *et al.*, 2012). The idea of having DLs was triggered by an astronomical rise of information vis-a-vis the user's ability to manage such an avalanche of information, the proliferation of digital devices like mobile phones and laptops (Chisita and Chiparausha, 2019). However, some factors need to be considered regarding the development and usage of mobile DLs. These factors have contributed to the development of mobile DLs' enhanced usage and hindered technical progress. The development and the usage of mobile DLs are essential, as these libraries create a novel way to enhance connections between patrons and libraries by providing services like Online Public Library Catalogues via mobile-optimized websites, audiobooks, e-books, audio language courses, streaming music, films, images and other multimedia that can be used on mobile devices (Nalluri and Gaddam, 2016, p. 65). Mobile DLs can easily offer many services. There are three types of mobile information services provided by DLs, namely, Short Message Services, Wireless Application Protocols and Applications (Liu *et al.*, 2020). According to the authors, APP is more widely used because of its advantages such as small size, ease of carrying and good user experience. Mobile DLs have become critical devices and platforms used by libraries to widen access to information irrespective of space and time. Users can access library instructional materials and resources via mobile platforms through such technologies. For example, "Research First Aid" is a series of podcasts for library researchers on the go (Nalluri and Gaddam, 2016, p. 61). Some libraries are offering "text a librarian" services ideal for simple questions that can be answered with brief responses. The current study reports on the extent to which literature has reported on the factors that affect the development and use of the mobile DL.

Singeh *et al.* (2020) argued that the concept of DLs, with their promising benefits, had attracted global attention from researchers and universities. With the advancement of technology, these platforms have advanced and proliferated, as evidenced by the increase of m-libraries adaptation in academic institutions. DLs refer to software that provides services

for students to read, write and create a connection with others through electronic texts (Bala, 2020). DL software proffers services for enhancing learning, teaching and research by delivering content abroad via the licenced mobile interface at any place with an internet connection without a time constraint (Brueck *et al.*, 2019). Callahan (2005) described an interface as the critical point of interaction between a user and a computer system, for example, a mobile device, laptop or desktop computer. Callahan (2005) contends that the critical question that confronts interface designers relates to making informed decisions concerning functions that are localisable and those that can be internationalised. Such decisions help design user interfaces that appeal to the cultural diversity of users. Eames and Aguayo (2020) contended that mobile devices permit users to access services and information irrespective of time and space. Saroia and Gao (2019) and Almaiah *et al.* (2019) argued that mobile users consider efficiency and availability as the most significant paybacks of M-learning and that these benefits are products of a mobile device's "mobility". Raja and Nagasubramani (2018) states that education delivery has progressed from purely face-to-face to varying degrees of blended and distance learning modes.

Liu *et al.* (2020) argued that the rapid development of mobile DLs had permeated all aspects of socioeconomic activities. The authors, as mentioned above, cited mobile phones as the most sought-out internet terminals, which have immensely contributed to people's learning process. The integration of mobile information services into various fields serves as evidence of the critical role of such devices in an era of constant technological progress. Mobile digital devices enable users to access learning content using smartphones, smartwatches, PDAs and tablet personal computer technologies (Kumar and Mohite 2017; Kumar and Goundar 2019). Mobile DLs also encompass hand held or other portable digital equipment capable of providing data communication between two or more individuals, including, but not limited to, a text messaging device, a paging device.

Research problem

Mobile digital libraries have become the norm worldwide because of their potential to advance student and researcher access to academic resources (Alfaresi and Hone, 2018). The technologies mentioned above are critical for realising technical progress in South Africa's Higher Education sector's drive to widen access to education. However, progress towards the successful development and use of mobile DLs for teaching, learning and research is impeded by many factors, including high data costs, slow speeds and unreliable networks. Like any other part of the globe, the digital divide in South Africa compounds the move towards successful implementation and use of mobile DLs. The inability to address the abovementioned problem will prevent students from experiencing exclusion in learning, research and employment prospects. It is ideal for the Higher education sector in any country to be the hub of technical progress. Nevertheless, it is a challenge because of a lack of planning and the unavailability of resources. As a result of the differences among academic institutions in terms of technological resources, Africa's progress in technical education is hindered. While the South African Library Transformation Charter (Nkondo *et al.*, 2014) emphasises the urgent need to digitise libraries, students and researchers still lack convenient access to digital technologies including mobile DLs. This article seeks to examine the factors that determine the successful development and the use of mobile DL in South Africa by drawing lessons from other countries.

Research questions

The following objectives guided the study:

- define mobile DLs;

- analyse the factors contributing to the successful development and use of mobile DLs;
- describe the quantity of articles hosted in selected databases focusing on the factors contributing to the development and mobile DLs' usage;
- highlight the lessons that can be drawn from the critical success factors (CFS) of other countries in developing mobile DLs; and
- suggest recommendations to enhance the use of mobile DLs in South Africa's higher education.

Methodology

The guidelines for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed when this particular systematic review was done. PRISMA is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses. The PRISMA Statement methodology helped define keywords and their alternative word regarding the current study. The researchers searched Emerald insight, Science Direct and Google Scholar databases to identify systematic reviews and meta-analyses relating to mobile or M-libraries published between 2016 and 2021. The search focused on scientific journals, and the results considered the most pertinent became the focus of the study. The researchers identified the keywords relating to m-libraries and factors affecting DLs' use. It should be noted that there are no ethical issues involved since the study is based on published scholarly articles.

Search strategy

Finfgeld-Connett and Johnson (2013) noted that literature searches should be viewed as open-ended iterative processes, whereby the topic or research question of interest is honed over time as the nature of the evidence becomes more apparent for the researcher.

Science Direct, Emerald Insight and Google Scholar databases were used to search for articles relevant to the topic of this article. The research was searching for articles published from 2016 to 2021. The search strategy used included the following keywords: (Factors affecting the development of "mobile digital library" AND Factors affecting the use of "mobile digital library".

Inclusion and exclusion criteria

Included in the study were articles on factors that affect the development or the usage of mobile DLs. The criterion for inclusion included the following:

- publication date between 2016 and 2021;
- empirical nature of the study;
- articles from developing countries that can provide classical lessons concerning the development and use of mobile DLs;
- written in the English language; and
- publication in a scholarly peer-reviewed journal.

These articles were published from 2016 to 2021. The focus was not on the specific region. Articles and other records published before 2016 were excluded. Grey literature, including thesis and dissertations and conference papers, were also excluded. Articles that were not on mobile or DLs were also excluded. The literature mentioned above is produced outside the

traditional publishing and distribution channels and is not represented in indexing databases. Studies were excluded from the review if they fell short of the following:

- unpublished thesis and dissertation studies; and
- not published in a peer-reviewed journal.

The researchers recorded the reasons for the exclusion of the selection of the reviews based on the above criterion.

Selection and data extraction involved the researchers screening and assessing all titles and abstracts to arrive at a selective decision. Contentious issues relating to disagreements on final inclusion were settled by discussion and consensus with all the authors of this study.

The researchers collected the initial set of relevant studies, and filtering was accomplished using the PRISMA methodology. After removing duplicates and non-article records, titles and abstracts of relevant articles were screened to identify relevant articles. Presented in a flow diagram below are the selection procedures followed. The researcher considered the results and methodology used to conclude the reviewed studies.

The workflow diagram for the methodology, including the selection procedures, is reflected in Figure 1 as highlighted above. The workflow diagram above reflects the selection and exclusion procedures for the study. The researchers identified 1,854 articles published between 2016 and 2021 from the Emerald, Science Direct and Google Scholar selected databases using the criterion highlighted above. Emerald constituted (84,3%, n = 1,562), Science Direct (11%, n = 204) and Google scholar (4.7%, n = 1,562). There were 66.7% duplicates removed (n = 1,236), and 33.3% (n = 618) remained. The duplicates were different versions of the same document. The selected 618 documents were screened further according to the selection and exclusion criteria, and (95.1%, n = 518) were eliminated. From the 30 full-text articles assessed for eligibility, a total of 53.3%, n = 16, were excluded because they were outdated according to the criterion for inclusion. The workflow shows that 14 articles passed the criterion for inclusion. These articles were published between 2016 and 2021, and they used an empirical methodology, were written in English and were published in scholarly peer-reviewed journals. The articles that met the selection criterion focused on factors relating to the successful development and use of mobile DLs.

Results

The literature reviewed for this study is confined to 2016–2021, with 14 articles precisely identified for use in the study. Reflecting on Table 1, below are 14 articles that were identified. The selected articles, as shown in the workflow diagram above, fulfilled the criterion highlighted above. These articles were within the time limit from 2016 to 2021.

An analysis of selected publications describing the factors contributing to the development of mobile digital libraries in each country was undertaken.

The study selected and used 14 articles from China, Hong Kong, Iran, Jordan, Malaysia and South Africa. China had (50%, n = 7), Hong Kong (7.1%, n = 1), Iran (7.1%, n = 1), Jordan (7.1%, n = 1), Malaysia (14, 3%, n = 2) and South Africa (14, 3%, n = 2) that were selected for analysis. The inclusion and exclusion criteria have been highlighted above. China has a higher percentage because it is among the leading countries with a high mobile technology penetration of above 84%. The Figure 2 below illustrates the number of publications by country.

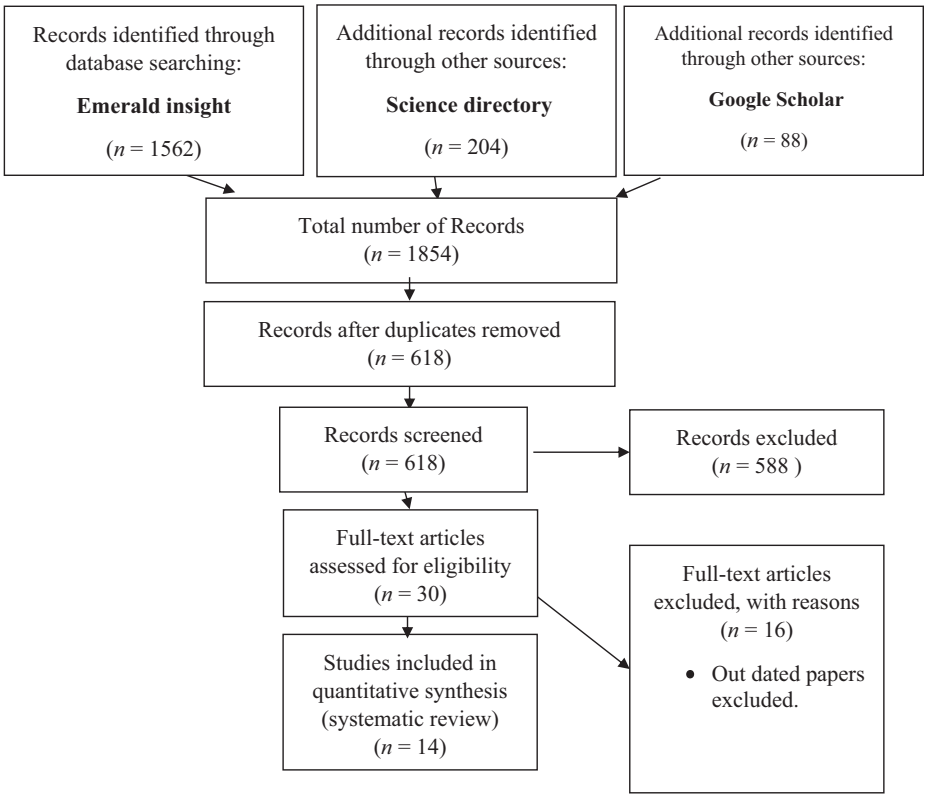

Figure 1.
Flow diagram of selection procedures followed for the study

Source: Created by the authors

Discussion of literature from the table

The above literature review reveals that the increase in the usage of digital technology has resulted in some libraries introducing remote access to library services. The reviewed literature also indicates that there are factors that affect the usage of library resources by users. The reviewed papers confirm the CFS in the development and usage of mobile DLs. The CFS include socio-cultural, technological and cognitive factors. The CFS for mobile DLs implementation derived from the literature review include social-cultural backgrounds of the students, as highlighted by Rafique *et al.* (2021). Similarly, Srite (2006) emphasised that national culture effect on the acceptance and use of information technologies, thus giving credence to culture as a CFS for the successful development and usage of m-libraries. Alroobaea *et al.* (2021) cited performance expectancy as determining students' acceptance of new technology. The performance acceptance factor is premised on the notion that a user will accept new technology based on the extent to which that individual perceives that using a system will help in attaining a gain in job performance (Venkatesh *et al.*, 2003). Singeh *et al.* (2020) argued that studies on the CSF's of DLs have the potential to unleash improved performance and desirable ways of augmenting the DL implementation process. CSF underpin the success of technical progress and the realisation of organisational goals.

Table 1. List of articles identified for the study

Author/s	Title of article	Journal	Year	Findings
Yip, K.H.T.; Lo, P.; Ho, K.K.W.; and Chiu, D.K.W.	Adoption of mobile library apps as learning tools in higher education: a tale between Hong Kong and Japan	*Online Information Review* (Hong Kong)	2021	• When developing mobile library apps for teaching and learning purposes, there is a need to consider socio-cultural factors and students' cultural backgrounds • Performance expectancy of the mobile app is a critical factor in encouraging learners to access mobile library services
Wang, X.; Li, J.; Yang, M.; Chen, Y.; and Xu, X.	An empirical study on the factors influencing mobile library usage in IoT era	*Library Hi Tech* (China)	2018	• Information, people, and information environment affect behavioural intention to use the mobile library • The ability of users to use the latest technology to retrieve information • Information factor: Information quality significantly influences the user experience of mobile libraries • Strong resource compatibility, accessible operation mode, timely reminders, and recommendation service functions will provide a better experience to users • The mobile library can increase the users' experience by using the advanced technology application, improving the stability and fluency of the system platform, enhancing the user interface design, and optimizing resource acquisition
Hamad, F.; Farajat, S.; and Hamarsha, A.	Awareness and adoption of mobile technologies in the delivery of services in academic libraries in Jordan: a library staff perspective	*Global Knowledge, Memory and Communication* (Jordan)	2018	The following factors were identified as the ones that can affect the usage of a digital library: • Staff awareness and understanding of how mobile technology can be used to provide some library services to users, i.e. loans, library catalogues and a means to communicate with users; • Availability of relevant resources; • Library staff technological competency; and • Incompatible information technology infrastructure External factors (age, job title, educational level and experience) affect the use of mobile technology concerning the enhancement of library services

(*continued*)

Table 1.

Author/s	Title of article	Journal	Year	Findings
Hu, J. and Zhang, Y.	Chinese students' behaviour intention to use mobile library apps and effects of education level and discipline	*Library Hi Tech* (China)	2016	The following factors were identified as the ones that affect mobile library apps usage: • System quality (the ability of the mobile library app to operate stably and reliably); • Information quality (provision of accurate and timely information); • Service quality (provision of services that can meet the needs of library users); and • Perceived usefulness (usefulness of the mobile library app)
Rahman, A.R.A.; Mohezar, S.; Habidin, N.F; and Fuzi, N.M.	Critical success factors of the continued usage of digital library successful implementation in military-context: an organisational support perspective	*Digital Library Perspectives* (Malaysia)	2020	• The quality factors of DL systems have a strong influence on satisfaction, behavioural intention and variance in actual use • Better-educated and middle-aged faculty members with a wide experience of using e-resources are more likely to continue using e-resources • "An access to tools such as databases, electronic journals and online reference tools could improve the quality of teaching of military educators"
Soltani-Nejad, N.; Taheri-Azad, F.; Zarei-Maram, N. and Karim Saberi, M.	Developing a model to identify the antecedents and consequences of user satisfaction with digital libraries	*Aslib Journal of Information Management* (Iran)	2020	The following factors affect the usage of the digital library: • Comprehensive and accurate digital information resources have a direct effect on user satisfaction • System quality, information quality, and service quality of digital libraries significantly affect user satisfaction • The usability of digital libraries has a positive effect on user satisfaction • Resources will increase the efficiency of users' work

(*continued*)

Table 1.

Author/s	Title of article	Journal	Year	Findings
Ocrana, T.K.O.; Underwood, E.P.G.; and Arthur, P.A.	Strategies for successful implementation of mobile phone library services	*The Journal of Academic Librarianship* (South Africa)	2020	The following were discovered as factors for the successful implementation of mobile phone library services: • Training of students on how to use mobile platforms to access the range of library services; • Ensuring proper foundation for the mobile platform; • Involving users when deciding on services that would be available on mobile platforms; • Well-trained library staff; • Financial support; • Ability to use the latest technology; and • Proper marketing of mobile phone library services
Rafique, H.; Alroobaea, R.; Munawar, B.A.; Krichen, M.; Rubaiee, S. and Bashir, A.K.	Do digital students show an inclination toward continuous use of academic library applications? A case study	*The Journal of Academic Librarianship* (China)	2021	Factors affecting mobile library applications are: • The service quality positively affects mobile library applications • Level of education for both users and staff
Rahman, A.R.A. and Mohezar, S.	Ensuring continued use of a digital library: a qualitative approach	*The Electronic Library* (Malaysia)	2020	The factors affecting the Digital Library system's successful implementation: • the quality of the system offered; • The support provided by the organization to the library; • The provision of user training to empower users with digital literacy skills; and • Marketing of the digital library Access to tools, such as databases, electronic journals and online reference tools, could improve the quality of teaching of military educators

(*continued*)

Table 1.

Author/s	Title of article	Journal	Year	Findings
Xu, F, and Du, J.T.	Examining differences and similarities between graduate and undergraduate students' user satisfaction with digital libraries	*The Journal of Academic Librarianship* (China)	2019	Factors affecting user satisfaction with digital libraries are: • System quality; • Information quality; • Service quality; • User-friendliness of the system; and • The usefulness of the system.
Xu, F, and Du, J.T	Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities	*Computers in Human Behavior* (China)	2018	Factors influencing users' satisfaction and loyalty to digital libraries are: • Information quality; and • System and service quality significantly
Wang, X.; Yang, M.; Li, J. and Wang, N	Factors of mobile library user behavioral intention from the perspective of information ecology	*The Electronic Library* (China)	2018	Positive and essential factors affect users' attitudes towards using a mobile library • Information quality (usefulness, availability, accurateness and suitability of information) • Information environment (internal environment refers to information transmission and access built by the information system, including service mode and quality. External environment refers to the users' external social environment, including the behaviours of the people around them, cultural atmosphere, among others); and • The nature of the ICT infrastructure, for example, software, hardware, networks and various technologies used to manage and process information
Masenya, T.M. and Ngulube, P.	Factors that influence digital preservation sustainability in academic libraries in South Africa	*South African Journal of Libraries and Information Science* (South Africa)	2020	Identified factors hindering digital sustainability: • A lack of institutional commitment and involvement; • Absence of established digital preservation standards, • Policies and procedures; • Inadequate resources; • Lack of skills and training; • Lack of funding; • Limited collaboration efforts and partnerships; and • Technological obsolescence

(*continued*)

Author/s	Title of article	Journal	Year	Findings
Liu, L.; Su, X.; Akram, U. and Abrar, M	The User Acceptance Behavior to Mobile Digital Libraries	*International Journal of Enterprise Information Systems* (China)	2020	Factors influencing a user acceptance behaviour to the mobile digital library are: • Social influence; • User innovation; • Payment value; • Performance expectancy; • Facilitating condition; and • Motivation/intention to use available digital library systems

Source: Created by the authors

Table 1.

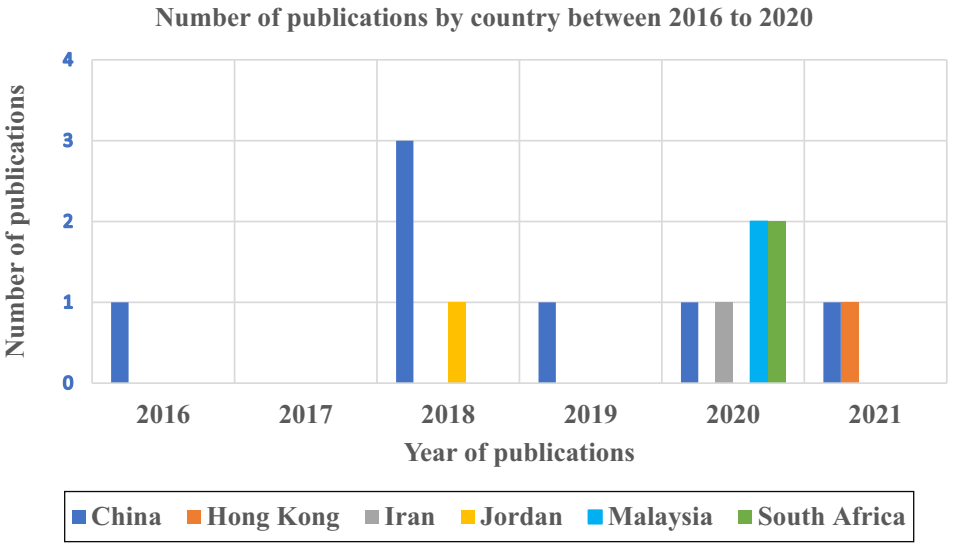

Figure 2.
Number of publications by country

Source: Created by the authors

Rafique *et al.* (2021), Rahman and Mohezar (2020) and Wang *et al.* (2018a, 2018b) cited quality of information, people, digital literacy, retrieval skills, resource compatibility, user interface design and information as CSFs that affect behavioural intention to use the mobile library. Similarly, Liu *et al.* (2020) highlighted social and technological factors as CSF in the development and usage of mobile DLs.

The study by Yip *et al.* (2021) examines students' perception of mobile technology adoption for library service apps as a lens to explore the factors affecting mobile learning in higher education in academic institutions in Hong Kong and Japan. The study was based on a comparative study to gain insight into students' perceptions towards adopting mobile apps as learning tools and the sociocultural factors that affect such adoption. According to the study mentioned above, the research subjects articulated positive attitudes towards accessing DLs through mobile devices because of the perceived usefulness (PUs) and perceived ease of use (PEOU). According to Yip *et al.* (2021), when developing future mobile library apps for teaching and learning, sociocultural factors and students' cultural backgrounds must be considered as CSF. The issues relating to colours, icons, navigation controls and other visual signals should resonate with the user's expectations of the home-grown culture (Del Galdo,1996). Callahan's (2005) study on interface design highlighted that interface designers should design icons that resonate with the cultural diversity of users because some symbols can be misinterpreted because of the different meanings attached to them from one culture to another. Therefore, adapting mobile library applications should be sensitive to culture to enhance human-to-computer interaction.

On a similar note, Ocran, Underwood, and Arthur, (2020) concurred with Yip *et al.* (2021) and Wang *et al.* (2018a, 2018b) findings that the uptake of mobile devices was growing as evidenced by a high number of students with access to such technologies for accessing libraries irrespective of time and space. Ocran, Underwood, and Arthur, (2020) findings highlighted the importance of digital literacy to enhance the use of mobile library devices to

access libraries. Wang *et al.* (2018a, 2018b) study on the factors influencing mobile library usage in the Internet of Things era established that information, people and information environment affect users' behavioural intention to use the mobile library in the information ecology environment. Yip *et al.* (2020) and Wang *et al.* (2018a, 2018b) both concur that the usage of mobile library usage is determined by a myriad of factors including human and sociocultural factors. The aforementioned consider the intersection among elements including sociocultural and technological factors and their effect on the adaptation of mobile devices. Hamad *et al.* (2018) investigated the potential of implementing mobile technologies within academic libraries in public universities in Jordan from the perspective of library staff. The study confirmed a high degree of awareness of the merits of mobile technologies and established that even though library staff is aware of the role and value of mobile technologies, there were technological knowledge and skills factors that interfered with the full adaptation of such technologies. Wang *et al.* (2018a, 2018b) and Yip *et al.* (2021) agree with Hamad *et al.* (2018) that socio-cultural and technological factors inhibit adaptation of mobile technologies for enhancing learning, teaching and research.

Hu and Zhang's (2016) study on the behaviour intention of Chinese university students towards m-library applications (apps) established that attitude was a critical determining factor affecting mobile library adaptation. The study also highlighted other equally crucial factors, for example, PU, self-efficacy, quality of m-library apps, education level and discipline. These findings also confirm the findings of Wang *et al.* (2018a, 2018b), Yip *et al.* (2021) and Hamad *et al.* (2018) emphasise psychological, technical and educational factors as critical determinants of mobile use adaptation among students in academic institutions.

In a similar study, Abdul Rahman, Mohezar, Habidin and Mohduzi (2020) identified the CFSs of the continued usage of DL, such as the user-driven implementation, institutional support, training and education, the DL milieu and communication support, a continuation of usage intention, net benefits and user satisfaction. While the study mentioned above was conducted in the military context, Wang *et al.* (2018a, 2018b), Yip *et al.* (2021) and Hamad *et al.* (2018) conducted their studies in educational settings. However, the studies mentioned above share a common denominator in that they concur on the impact of socio-economic and technological factors as critical determinants of the successful adaptation of DLs. The only difference is that the study by Abdul Rahman *et al.* (2020) focuses on DLs in general. However, it does not categorically mention mobile DLs, whereas Wang *et al.* (2018a, 2018b) and Yip *et al.* (2021) precisely mention the term.

Soltani-Nejad *et al.* (2020) viewed system quality, service quality and information quality as critical factors in forming perceived usefulness, PEOU and DLs' affinity. This study focused on the roots and consequences of user satisfaction with DLs. The study concurred with Soltani-Nejad *et al.* (2020), who highlighted system quality, service quality and information quality as critical factors in the development of PU and PEOU of DLs.

Masenya and Ngulube (2020) studied the factors that underpin digital preservation sustainability in academic libraries in South Africa. This study has a different focus from the studies conducted by Wang *et al.* (2018a, 2018b), Yip *et al.* (2021), Hamad *et al.* (2018) and Soltani-Nejad *et al.* (2020) who precisely focussed explicitly on factors that affect DLs adaptation and usage among users and institutions. The study by Masenya and Ngulube (2020) focussed on digital preservation in academic libraries and highlighted the following as critical determinants as highlighted below:

- implementation of relevant policies and strategies;
- proper allocation of resources;

- legal issues;
- collaboration and partnerships opportunities;
- technical expertise; and
- institutional supporting factors.

The factors highlighted above emphasise the importance of preserving digital content in academic libraries and do not mention mobile DLs as done by Wang *et al.* (2018a, 2018b) and Yip *et al.* (2021). Nevertheless, Masenya and Ngulube raise an important point that can contribute to the success of DL initiatives concerning sustainability. The authors mentioned above emphasis on digital preservation implies a concern for the institution generating the content and the users who will want the content to be available whenever they need access. It forewarns institutions that host DLs not to disadvantage users because of such shortfalls as link rot or content drift.

Król and Zdonek (2020) described link rot as a phenomenon whereby hyperlinks tend over time to cease to point to their originally targeted file, web page or server because of that resource being relocated to a new address or becoming permanently unavailable. Content drift refers to a continuous slow movement of contents from one place to another. Content drift can be noticeable where the link's content (anchor text) suggests a different content or "deceitful" where the content at a particular address may change dynamically, which can be because of the nature of the source (Król and Zdonek, 2020). The factors highlighted above emphasise the importance of preserving digital content in academic libraries and do not mention mobile DLs, as done by Wang *et al.* (2018a, 2018b) and Yip *et al.* (2021). Nevertheless, Masenya and Ngulube raise an important point that can contribute to the success of DL initiatives concerning sustainability. The authors mentioned above emphasise that digital preservation implies a concern for the institution generating the content and the users who want it to be available whenever they need access. It forewarns institutions that host DLs not to disadvantage users because of such shortfalls as link rot or content drift. Król and Zdonek, (2020) described link rot as a phenomenon whereby hyperlinks cease to point to their originally targeted file, web page or server because of that resource being relocated to a new address or becoming permanently unavailable over time. Content drift refers to a continuous slow movement of contents from one place to another. Content drift can be noticeable where the link's content (anchor text) suggests a different content or "deceitful" where the content at a particular address may change dynamically, which can be because of the nature of the source (Król and Zdonek, 2020).

Limitations

- Even though the study is based on literature searches across databases, some related papers were missed because the focus was on articles published in English as outlined in the inclusion criterion, including selected search terms and database limitations.
- Secondly, vital data might be found in non-peer-reviewed studies, for example, unpublished theses and dissertation studies.
- The articles selected are from developing countries since they share common social-cultural and technological development. However, the articles also refer to developed countries, and some of the authors are based in developed countries, for example, Du, (2019) who is based in Australia based at the University of South Australia. Furthermore, Yip *et al.* (2021) focusses on the adoption of m-library

applications in Hong Kong and Japan and these are equally developed countries (Human Development Report, 2021/2022).

Conclusion

This paper aims to review and report on literature focusing on factors affecting the development and use of the mobile DL. The literature on factors affecting the development of the usage of the mobile DL reveals that the same factors can either be a success or hindering factor. These factors can affect the usage of mobile DLs positively or negatively depending on how these factors are handled. When these factors are identified and acted upon, the usage of m-libraries will increase because libraries will enable users to conveniently access mobile DL resources and services irrespective of time and space limitations (Zha *et al.*, 2016, p. 1163). The discussion above confirms that the literature review identified the following as critical factors that can be both successful and inhibit the development and usage of mobile DLs:

- The provision of digital literacy training for library staff and users on the optimum usage of mobile platforms to access the range of library services can only be successful provided that users and library staff are weaponized with knowledge and skills on the use of digital technologies. Regular training for library staff and users is also helpful in sustaining skills and ensuring that users do not relapse into "digital-literates illiterates". The inability to train users will undermine the success of the library programmes (Masenya and Ngulube's, 2020).
- Financial support from the organisation is critical to ensure the sustainability of service provision. A sustainable budget will provide for the maintenance and updating of hardware and software.
- Using the latest technology for mobile DLs is critical in an era of constant change. The library staff and users must be able to use the latest technology, for example, intelligent technologies, big data and artificial intelligence. As the mobile DL system is updated, the system's users must keep up with the latest technology. The adaptation of user-centric DL technologies will provide an opportunity for personalised service development.
- The effective marketing of mobile DL services is essential in ensuring their optimal use by users. Library orientation, information and metaliteracy programmes will ensure that users of the mobile DL are aware and weaponized to benefit from the services offered by the library. If library user is aware of these services, the usage of the mobile DL will be optimised.
- Providing reliable internet connectivity is critical in ensuring uninterrupted access to digital content and this can be achieved by partnering with commercial and non-commercial internet service providers (ISPs). The non-commercial ISPs include National Research and Education Networks that provide internet connectivity at a relatively affordable cost compared with the commercial ISPs. The mobile DL platform should be user friendly. The library must ensure that the system is user friendly, for example, ease of navigation and use and provision for technical support. Users will be encouraged to use the mobile DL if it is easy to access library resources because of the system.
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technical support. Users will be encouraged to use the mobile DL if it is easy to access library resources because of the system.

The literature identified the following as critical factors that can lead to success or failure in developing and using mobile DLs.

- The provision of digital literacy training for library staff and users on how to use mobile platforms to access the range of library services

This can be both a success factor if users and library staff are weaponised with knowledge and skills on how to use the panoply of digital devices in accessing library services. This means there must be training for library staff and regular training for users. Failure to train these groups of library users will transform this factor into a hindering factor. Masenya and Ngulube's (2020) study on the sustainability of digital projects in South Africa emphasised the importance of training as a CFS. Although the authors mentioned above do not explicitly mention training or information literacy as CFS, it is clear from their findings that organisations can provide training in digital literacy as a CFS, following Masenya and Ngulube's (2020) findings:

- Ensuring proper foundation for the mobile digital platform

The library must ensure that the system is user friendly. Users will be encouraged to use the mobile DL if it is easy to navigate and access library resources because of the user-friendly nature of the system. Xu and Du (2019) findings emphasised the user friendliness of the information system, as a CFS that can motivate users to use optimally the service:

- Financial support

If there is no financial support from the organisation, it will be difficult to develop and motivate library users to use the mobile DL because the library system needs to be maintained and be up to date all the time. Without money, it will be very difficult to have a successful mobile DL:

- Ability to use the latest technology

Both library staff and user must be able to use the latest technology. Technology improves all the time. As the mobile DL system is updated, the user of the system must keep up with the latest technology:

- Proper marketing of mobile DL services

Library orientation and other services that will ensure that users of mobile DL are aware of the services offered by the library are important. If library user is not aware of these services, the usage of the mobile DL will be poor.

Future research directions

The article accentuated the critical considerations of successful development and the use of mobile DL systems concerning usage in the context of South Africa. The literature review findings indicate that many factors must be considered to implement mobile DLs successfully. There is a need to ensure that such programmes are aligned with National Development Goals and the engagement of multiple stakeholders, including government, industry, ISPs and academic institutions. It is incumbent upon the government and key stakeholders to work together through strategic partnerships to ensure the sustainability

of digital infrastructure concerning hardware, software and expertise. Librarians in academic institutions should implement Continuous Professional Development and Workplace Learning Programmes to ensure that staff are updated with the relevant skills. Partnerships with local and international organisations that provide CPDWL programmes on DLs are critical. Research should be conducted to generate valid evidence on the usefulness of courses provided by the Digital Preservation Coalition under the auspices of the National Archives of the UK. It should be noted that developing and implementing successful mobile library services is a continuous process with its own challenges and opportunities.

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