

## **Investigation into the Challenges Associated with the Delivery of Library Services on Mobile Technology Platform**

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### **Abstract**

Challenges in implementing technology-based services in academic libraries have witnessed quite a lot of work in this area. This study assesses some of the challenges associated with the delivery of library services on mobile technology (m-tech) platforms. A survey research design and the mixed method approach were used in conducting this research. The topmost m-tech based library services identified in the study include mobile digital repository; mobile online public access catalogues; referencing services; SMS alerts; selective dissemination of information as well as mobile instructional guides and tours. The study established that insufficient ICT infrastructure; bureaucratic processes; poor internet bandwidth; lack of IT experts and staff; lack of a policy framework; erratic or unstable power supply; lack of support from the university management; in addition to financial constraints prohibited the full provision of library services through m-tech across the libraries studies. Based on these findings, this research offers some recommendations that would serve to overcome, in part the challenges associated with the implementation of m-tech based library services in academic libraries.

*Keywords:* Mobile technology, academic libraries, library services, mobile technology based library services, mobile technology challenges; Ghana

## Introduction

The information needs of many patrons of academic libraries are drifting towards a preference for online information (Okello-Obura, 2010). The advancement in ICT devices especially in the area of mobile technologies (m-techs), alongside a sharp increase in accessing electronic resources by library users have altered the face of informatics and how people communicate, interact and access information (Swain & Panda, 2009; Singh, 2009). Academic libraries around the globe are shifting from the conventional delivery of printed information to electronic information to effectively serve the needs of their users who are now often, adept to using emerging technologies to access information.

M-tech-based library services involve the delivery of library services through mobile devices. They include tailor-made m-tech services such as mobile instant messaging for reference services, SMS alerts services, mobile databases and e-journal finder, mobile online public access catalogue (MOPAC), mobile library instructions and virtual tours, mobile research consultations, library user education through mobile devices platforms (Hung & Chanlin, 2015; Ghosh, 2016). M-tech-based library services can also be developed to capitalize on social media services such as Twitter feeds, Facebook feeds, blogs and podcasts.

Liu and Briggs (2015) postulated that m-techs assist and provide the medium for dissemination and retrieval of information with the use of handheld mobile devices such as tablets, smartphones, e-book readers, iPod, PDAs' among others. Currently, a lot of mobile devices are embedded with several applications, functionalities and unique attributes that can be used to access a wide variety of digital content. It has, for example, been asserted that “most mobile devices are now built with features that are capable of accessing and processing information just like desktop computers” (Khaddage & Latteman, 2013, p. 7).

Saravani and Haddow (2017) also indicated that as the demand for online access to information increases regardless of the location of the clientele, academic libraries have been actively accepting initiatives to digitise and preserve physical materials, to store them in online repository systems and to encourage their free access via mobile platforms with the aid of m-tech. A body of literature such as Canuel and Crichton (2011); Hallam (2009) and Latham and Poe (2012) on m-tech based library services demonstrates that the academic library settings globally are shifting from the routine traditional environment to the mobile environment. Most academic libraries have been involved in early and continual endeavours by assessing the changing nature of the libraries, both in its current state and in the future and critically aligning their technological strategies to reflect on these innovative changes especially in the area of mobile-based library services which are m-tech driven.

Despite the growing usage of mobile devices among students and the availability of mobile broadband and WIFI internet almost everywhere in the developing countries (Rogers, 2012), academic libraries in Ghana are yet to fully exploit this opportunity and provide m-tech based library services. A Jumia Annual Mobile Report (2018) indicated that mobile devices subscriptions in Ghana are anticipated to reach about 40 million in the next two years. The report further stated that by 2021 Ghana's mobile device usage will witness over 130% growth and that, currently, Ghanaians are among the top mobile device users in Africa.

There is, however, a lack of rigorous research that have ascertained the challenges associated with the adoption and implementation of m-tech based library services in academic libraries, specifically, Ghana. For instance, in a study to ascertain the usage of m-techs for social media-

based library services in a Ghanaian university, Akeriwa, Penzhorn and Holmner (2014) discovered that not only do respondents have a favorable attitude towards mobile phone-based library services, but also, with the right infrastructure and technical know-how of personnel, this service can be offered unhindered. This study, therefore, assesses the challenges associated with the delivery of library services on m-tech platform.

### **Mobile Technology-Based Library Services**

According to Toner (2008), developments in technologies have created virtual lecture rooms and mobile learning. In their drive to continue to meet the needs of their users' and remain vital to support teaching, learning and research, academic libraries have to integrate new technologies in their operations (Toner, 2008). Modern trends in academic libraries indicate a paradigm shift towards a web environment where innovative technologies are being utilized to offer contemporary services (Moyo, 2004). Choi (2009) affirmed that the availability of affordable mobile broadband internet and the growing in usage of mobile devices and technologies among academic library users have afforded them the convenience to remotely access library resources anytime, anywhere and seek online assistant from librarians.

Griffey (2010) postulated that as more students make use of the internet on their mobile devices most often using their smartphones as compared to conventional PC, academic libraries should acknowledge the benefits of m-tech and provide services through such medium to meet users' needs. In 2009, the Association of Colleges and Research Libraries anticipated that "ubiquitous presence of WiFi, handheld communication devices, smartphones, among others will spur libraries to re-tool content for mobile users and mobile devices" (Lowry, 2010, p. 4). Murphy (2011) also mentioned that academic libraries are creating mobile content and solutions in this era of information age to meet the needs of students and researchers whom now prefer the use of m-tech for rigorous research. M-tech applications help libraries to design modern and stimulating services to patrons. They provide the prospect for academic libraries to improve their traditional library services through mobile collections and databases, mobile catalogues, mobile SMS services, mobile library instructions and virtual tours (Hahn, 2008).

In the Ghanaian context, m-tech based library services are yet to receive recognition. This is largely due to the fact that development in terms of new technologies has always been a problem in developing countries. Kamba (2011) in his studies in Africa revealed that 85% of the libraries offer less than one PC for every hundred (100) library users. About 15% of them do not work with computers and are not connected to the internet at all. Technologies are not fully exploited to realize the maximum benefits in university campuses in Ghana (Armah, 2009).

Kurkovsky and Meesangnil (2012) also argued that the adoption and applications of m-tech to prioritize delivery of mobile content services is the new dimension in most information centers globally. M-tech based library services create the medium for librarians to develop digital content for library users through the use of mobile technologies. Now, with mobile technologies, patrons can search a library's catalogue, view upcoming events, make a reservation for library facilities, text for reference enquiries, and renewed borrowed materials on their mobile devices. The m-tech based library services make use of smartphones, tablets computers, as well as PDAs' among other mobile devices to present a novelty and opportunities for information centers to provide services for their remote users (McKiernan, 2010; Paterson & Low, 2011).

Mansouri and Soleymani (2019) revealed that the most contemporary services that users want to have on their mobile devices are mobile collections and databases, circulation and renewal services, mobile reference services (Ask a librarian) and mobile library tour or instructions. In the global scene, different strategies are adopted by top universities libraries to offer m-tech based library services (Pakdaman, Sharif, Ziaei & Ghaebi, 2018). Choy and Goh (2016) and Hung and Chanlin (2015) also identified mobile online public access catalogue (MOPAC), mobile e-journal, mobile databases, short messaging services (SMS) for reference services, mobile collections (e-books, audio materials), mobile digitized thesis, mobile library tour/instruction as some of the trending m-tech based library services around the world. However, Dukic, Chiu and Lo (2015) recommended that for libraries to offer services on m-tech platforms, they need to critically explore the exact information needs of their patrons.

### **Challenges Associated with the Implementation of Mobile Technology-Based Services in Academic Libraries**

The novelty of m-tech in academic libraries has its benefits but nevertheless, it has its own implementation challenges. The challenges in technology implementation in academic libraries have witnessed quite a lot of work in this area. The most ubiquitous factor which is lack of support from university management and stakeholders has been identified as one of the major hurdles facing the integration of new technology in academic libraries (Amekuedee, 2005; Saxena & Dubey, 2014). Another barrier facing m-tech adoption in libraries is inadequate funds to support such a project (Aina, Okunnu, & Dapo-Asaju, 2018).

Furthermore, Iwhiwhu, Ruteyan and Eghwubare (2010) reported in their study that libraries in Nigeria could not provide services through mobile devices because of insufficient funds to purchase the needed mobile infrastructures and telecommunication equipment. Similarly, an investigation by Chisenga (2015) discovered that quite a number of libraries in Sub-Saharan Africa lack funds to acquire library systems and maintain it. The findings further revealed that, most libraries surveyed lack funds to purchase library systems and those who have succeeded in acquiring commercial library systems or managed to automate some or all their operations lack the required funds needed for upgrade and maintenance their library systems (Chisenga, 2015). Anytime libraries fail or are unable to pay for either maintenance or license fees regarding software systems, they forfeit the opportunity to access technical support and the necessary updates from their vendors. This difficulty leads most libraries to stop subscribing or abandon the software system completely and shop for a less expensive software system instead which at the end might affect the overall systems efficiency in the libraries. M-tech integration in academic libraries also requires a lot of ICT facilities to support the integration and several studies have identified that, most often, these ICT facilities are inadequate (Rosengberg, 2005; Saxena & Dubey, 2014). In support of this, Chaputula and Mutula (2018) in their study in Malawi revealed that although most of the libraries studied were willing to offer m-tech based services; they still needed more desktop computers, tablets computers and servers with bigger capacity. Some of the libraries indicated resorting to the use of less costly and insufficient ICT infrastructure because of funding constraints. Again, many of them mentioned that they were using outdated servers that needed to be replaced with modern ones. Another barrier that has been identified with the inception of m-tech based library services in academic libraries is the lack of skilled or trained IT experts (Ahmed, 2011). Successful implementation of m-tech services in libraries depends on IT experts that can develop the technology and the system framework that drives such innovation. The human resource requirement in system design and implementation is key. However, library staff, quite often, do not possess the right kind of technological skills required for the smooth integration of

emerging technologies including m-tech based services (Haneefa, 2007; Ghuloum & Ahmed, 2011).

Also, difficulties arise in the bid to separate the content of the library service from the format of the mobile device. Ideally, a mobile library service should be device-independent and should work on diverse mobile devices. It has however been established that in the mobile environment, what may be compatible or convenient in one library might not necessarily be the case in another library since information needs of users differ (Pakdaman, Sharif, Ziaei & Ghaebi, 2018). The creation of content of library services in a format that can be accessed on mobile devices sometimes becomes a challenge and this affects the integration of m-tech in academic libraries. M-tech library services should have characteristics that make them accessible on different mobile devices. Notwithstanding this, Travis and Tay (2011) observed that libraries in the quest to offer services on mobile platforms faces challenges in developing to host services on a regular web page and that of mobile device interface leading to failure to achieve the expected outcome.

Unreliable power supply and Poor Internet connectivity have also been stated by many scholars as a hindrance to m-tech and ICT applications in academic libraries (Aina, Okunnu, & Dapo-Asaju, 2014; Chaputula & Mutula, 2018). A study by Maranto, Phang and Hartman (2010) revealed that the provision of m-tech services in academic libraries has not been effective owing to restricted and poor internet access services. In the same vein, Nicholsan (2011) research on m-techs in South Africa affirmed that most libraries in Africa are not able to provide services and information via m-tech platforms because of low internet speed and unreliable power supply.

Privacy is also another challenge affecting mobile technology application in the academic libraries. This arises because client personal information could be exploited by third parties such as law enforcement agencies and those who commit identity theft. Mobile technology in creating more services, tend to expose the user to potential invasion of the users' privacy.

### **Methodology**

The survey research design was used in conducting the study. The choice for the survey was influenced by the fact that the study was carried out with large population who were remotely dispersed across the campuses of the selected public universities. Thus, using the descriptive survey enabled data for the study to be collected from the large population at a relatively cheaper cost.

The approach for this study was the mixed method in collecting quantitative data (using questionnaires) and qualitative data (using interviews) from the respondents. The use of the mixed method approach helped in building the strengths of using both quantitative and qualitative data for the study (Cresswell, 2015).

The general population for this study comprised all the categories (public universities, private universities, technical universities) in Ghana. Out of these, the researchers purposively selected 356 respondents comprising students and library staff across the universities and academic libraries in Ghana. The choice of the students is due to the fact that they are the beneficiaries and patrons of the libraries and the services rendered by the libraries. Since the library staff are the service renders and providers, it was prudent to select them to serve as respondents for the study. The purposive sampling technique was adopted due to the unique characteristic of the

respondents and enabled the respondents to answer the questions. It enabled the targeted sample to be reached quickly and since proportionality was not the main concern.

The questionnaire and structured interview were used to collect data for this study. The study employed both quantitative and qualitative data collection instruments in the data collection because of the kind of information the researchers wanted to gather for the study.

The data that was collected was first edited to correct errors. It was then collated, coded and analyzed descriptively using the Statistical Package for the Social Sciences (SPSS) version 22.0 into frequencies and percentages. The data that were generated through the questionnaire were assigned with appropriate codes and analyzed. The results were presented in the form of tables, pie charts and bar charts showing frequencies and percentages of responses given by the respondents.

### **Presentation and Discussion of Findings**

This section presents the analysis of data from the field. It begins with services that can be delivered through m-tech platform, followed by the challenges associated with implementation of m-tech based library services, and concludes with recommendations towards the successful implementation and use of m-tech based library services in university libraries.

#### **Library services That Can Be Delivered via Mobile Technology Platforms**

Sharma and Sahoo (2014) opined that it is necessary to carefully plan to know the kind of services to be provided on mobile devices as a prerequisite for implementing m-tech based library services. The study shows that the topmost library services to be on m-tech platforms that were of interest to the respondents include Mobile Digital repository (e-books, journals, reports, thesis, etc.); Mobile Online Public Access Catalogue; Ask a Librarian (Referencing Services); SMS alert services for new arrivals; Mobile databases and e-journal collections; Selective dissemination of information; Audiovisual services; Mobile instructional guides and tours; Social Media Services; and Mobile E-resources

The respondents were also given the opportunity to provide comments on library services that can be delivered on m-tech platforms and these are enumerated below.

- It will be good if the services are developed into mobile apps
- The use of m-tech based library service would be more convenient for users
- The usage of m-tech based website is friendlier than normal regular website.
- Library services made available on m-tech can be downloaded by any student easily.
- M-tech library services can be easily accessible by users anytime and anywhere.
- Mobile accessible websites would make it possible for work pages that are very difficult to access on a mobile device accessible.
- Library services should be on both mobile app and mobile-accessible website.

The above findings corroborate the assertion by Paterson and Low (2011) that library services that can be delivered on m-tech platforms are library services that can make use of smartphones and other mobile devices such as computer tablets, cell phones, e-book readers and PDAs'. They include mobile online public access catalogues (MOPAC's), mobile e-journal, mobile databases, short messaging services (SMS) for reference services, mobile collections (e-books, audio materials), social media services, mobile digitized thesis and mobile library tour/instructions (Hung & Chanlin, 2015; Ghosh, 2016). It also resonates with literature which noted that major academic libraries in China had designed mobile interface that allows library

users to use mobile devices to access their digitized institutional repository and browse through the library's academic databases and e-journals (Li, 2013). Furthermore, Lippincott (2009) also affirmed that mobile reference enquiry services were extensively in the known to most of the students surveyed and that they preferred to use the services to get reference assistance from the librarians.

### **Challenges Associated with the Provision of Library Services Through Mobile Technology**

The novelty of m-tech in academic libraries has its benefits but nevertheless, it has its own implementation challenges. The challenges in technology implementation in academic libraries have witnessed quite a lot of work in this area.

Table 1: Challenges with the implementation of m-tech for the provision of library services

S/N	Challenges	Yes	No
1	Insufficient ICT infrastructure at the libraries	272 (76.4%)	84 (23.6%)
2	Bureaucratic process dragging the implementation after a decision to adopt	274 (77.9%)	82 (23.1%)
3	Lack of support from the university management	295 (82.9%)	61 (17.1%)
4	Lack of appreciation for the technology among library staff	272 (76.4%)	84 (23.6%)
5	Poor internet bandwidth to drive the implementation of m-techs in libraries	308 (86.5%)	48 (13.5%)
6	Lack of IT experts to implement m-techs in libraries	283 (79.5%)	73 (20.5%)
7	Lack of a policy framework for the adoption of m-tech	293 (82.3%)	63 (17.7%)
8	Erratic/unstable power supply	283 (79.5%)	73 (20.5%)
9	Lack of requisite skills on the part of library staff	256 (71.9%)	100 (28.1%)
10	Financial constraints	272 (76.4%)	84 (23.6%)

On the whole, the findings in Table 1 revealed that the majority of the respondents agreed that insufficient ICT infrastructure at the libraries; bureaucratic process dragging the implementation after a decision to adopt; poor internet bandwidth to drive the implementation of m-techs in libraries; lack of IT experts to implement m-techs in libraries; lack of a policy framework for the adoption of m-tech; erratic or unstable power supply; lack of support from the university management; lack of requisite skills on the part of library staff; financial constraints; issue of sustainability; and lack of appreciation for the technology among library staff prohibited the provision of library services through m-tech in the libraries.

M-tech integration in academic libraries also requires deployment of a lots of ICT infrastructure. The respondents were asked to indicate whether they agree or disagree that lack of ICT infrastructure at their respective libraries will affect the implementation of m-tech based library services. The results indicated that a high percentage of the respondents (76.4%) agreed that insufficient and unsuitable ICT infrastructure at the libraries can affect the implementation of m-tech based library services. Several other studies have also identified that in most situations ICT infrastructure in libraries are inadequate (Rosengberg, 2005; Saxena & Dubey, 2014). In support of this, Chaputula and Mutula (2018) in their study in Malawi revealed that although



most of the libraries were willing to offer m-tech based services, they still needed more desktop and tablet computers and servers with bigger capacity. Some of the libraries selected for the study accepted resorting to the use of less costly and unsuitable ICT infrastructure because of funding constraints. Again, many of them indicated that they were using outdated servers that required to be replaced with modern ones.

On the issue of bureaucratic processes dragging the implementation after a decision to adopt and the lack of support from the university management, while 77.9% of the respondents agreed that bureaucracy could serve as challenges to the provision of library services through m-tech, 82.9% said “Yes” to the fact that lack of support from the university management could prohibit the successful deployment of m-tech to provide library services. Furthermore, the study established that large portion of the library staff (76.4%) think that the lack of appreciation for the technology among library staff could inhibit the deployment of m-tech for the delivery of library services. These challenges corroborate the findings identified by studies in other academic libraries. For example, Amekuedee (2005); Saxena and Dubey (2014) identified the lack of support from University management and stakeholders as a major constraint for the integration of ICT and m-techs in academic libraries. Akusah (2018) also posit that technology adoption in libraries should be appreciated by the staff to facilitate its use. He additionally indicated that lack of appreciation for technology adoption in libraries might affect any future plans to adopt emerging technologies.

The findings on respondents’ views as to whether they agree or disagree that poor or inadequate bandwidth will affect the implementation of m-tech based library services shows that 86.5% of the respondent agreed. This means that majority of the respondent agreed that poor or inadequate bandwidth will affect the implementation of m-tech based library services in their respective libraries. The results agree with earlier findings of Maranto, Phang and Hartman (2010) who indicated that the provision of m-tech services in academic libraries has not been effective owing to restricted and poor internet access services. In the same vein, Nicholsan (2011) research on m-techs in South Africa affirmed that most libraries in Africa are not able to provide services and information via m-tech platforms because of low internet speed and unreliable power supply.

Another barrier that can be identified with the inception of m-tech based library services in academic libraries is the lack of skilled or trained IT experts. Successful implementation of m-tech services in academic libraries depends on staff with the technical expertise that can develop the technology and the system framework that drives such innovation. The human resource requirements in system design and its implementation is key. The results of the study revealed that 79.5% of the respondents agreed that the lack of IT professionals or expert in their university library is a potential challenge to obstruct the implementation of m-tech based library services. Again, 71.9% of the respondents said “Yes” to the assertion that lack of requisite skills on the part of library staff might obstruct the successful deployment of m-techs for the delivery of library service. These results resonate with the findings of Ghuloum and Ahmed (2011) and Hamad et al (2018) that library staff of academic libraries quite often do not possess the right kind of ICT skills needed for the smooth deployment of emerging technologies.

The formulation and implementation of ICT policies provides a good background for the provision of library services via m-tech. This study established a contrary response as 82.3% of the respondents responded “Yes” to the fact that the lack of a policy framework for the adoption of m-tech can obstruct the successful implementation of m-tech based library services

in libraries. Amekuede (2005) found that there is lack of a systematic ICT policy in libraries and it impedes the deployment of and use of ICTs in libraries.

Technological systems feed on reliable power supply to be functional and continue to provide uninterrupted services for its users. In view of this, the successful implementation of m-tech based library services depends greatly on a reliable flow of power. Consequently, respondents were asked to indicate the extent to which they agree or disagree that erratic or unstable power can impede the implementation of m-tech based library services in their libraries. A large number of the respondents (79.5%) agreed that unstable or erratic power supply might affect the successful provision of library services through m-tech platforms. The findings confirmed what Okiy (2010) and Chaputula & Mutula (2018) established about unreliable power acting as a hindrance to ICT and m-tech applications in academic libraries in Africa.

Another barrier facing m-tech adoption in libraries is financial constraints to support such project (Aina, Okunnu, & Dapo-Asaju, 2018). This study corroborates the findings of Aina et al. (2018) by establishing that 76.4% of the respondents confirm that financial constraints could negatively affect the implementation of m-tech for library service provision. Similarly, Iwhiwhu, Ruteyan and Eghwubare (2010) reported in their study that libraries in Nigeria could not provide services through mobile devices because of insufficient funds to purchase the needed mobile infrastructures and telecommunication equipment. Furthermore, a study by Chisenga (2015) discovered that quite a number of libraries in Sub-Saharan Africa lack funds to acquire library systems and maintain it.

Subsequently, the researchers requested the respondents to indicate the most or critical inhibitor to the successful deployment of m-tech for the provision of library services. Figure 1 gives a breakdown of the responses.

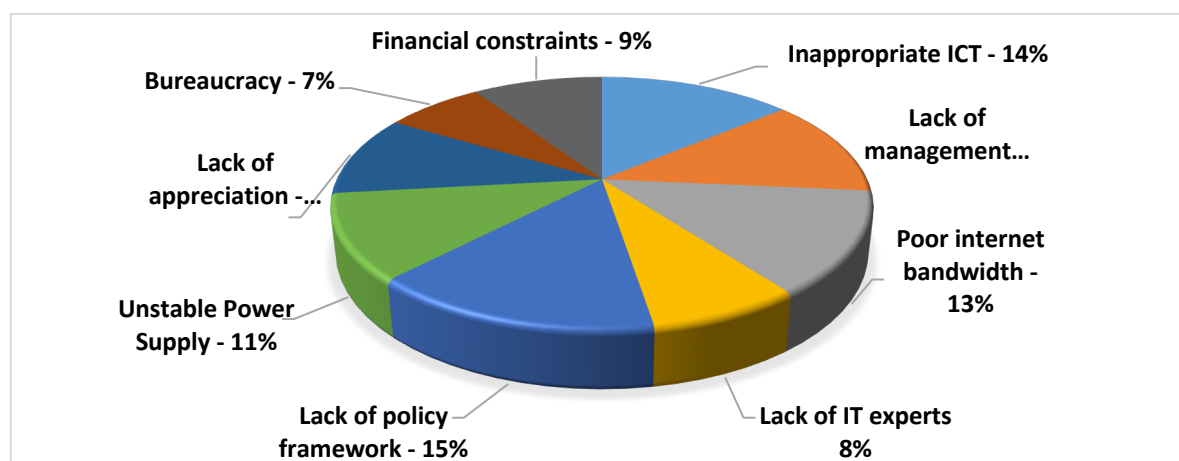


Figure 1: Inhibitors to the successful deployment of m-tech for library service delivery

The figure above clearly shows that the lack of a policy framework (15%) serves as the foremost obstruction to the provision of library services through m-tech. This was followed by inappropriate ICT infrastructure (14%); poor internet provision and bandwidth (13%); lack of management support (13%); unstable power supply (11%); lack of appreciation for m-tech adoption (10%); financial constraints (9%); lack of ICT experts/staff (8%); and bureaucracy (7%) as the inhibitor to the provision of library services through m-tech respectively.

Despite the challenges, the respondents indicated that the m-tech based library services have some perceived or actual benefits. According to the respondents, m-tech based library services

- is more convenient to use for academic work, hence, it improves academic performance
- makes it easy to download library resources. That is when library services are made available on m-tech platforms, the library resources can be downloaded by any student. Students can also install and uninstall or navigate the m-tech library app easily
- simplifies and make access to the library services quickly than the printed materials
- facilitate easy access to library materials/ services anytime and anywhere
- helps to improve access to library materials/resources and services
- facilitate more collaboration between the patrons and the staff of the library
- facilitate quick delivery of information resources to the patrons of the library
- helps improve the use of the information resources available in the library
- improve the quality and efficiency of the library
- giving easy communication with library users anytime.

### **Conclusion**

This research was set out to investigate the challenges associated with the delivery of library services on mobile technology platform within academic libraries in Ghana. Notwithstanding the usefulness of m-tech in providing strong communication channel that can offer better library services, this research indicates that the implementation of mobile technology-based library services in academic libraries will not be without challenges. This research also established that the challenges identified are not unique to only academic libraries in Ghana, but often reported among academic libraries in Africa.

### **Recommendations Toward the Implementation and Use of Mobile Technology-Based Library Services in University Libraries**

Based on the findings from the study, the following measures have been recommended to be deployed in other to resolve the challenges associated with the implementation of m-tech based library services in academic libraries:

1. The study found out that the absence of insufficient ICT infrastructure at the libraries surveyed as part of this research could inhibit the adoption and implementation of m-tech based library services. Issues such as poor internet bandwidth, lack of advanced ICT infrastructure and power fluctuations were found to be obstacles to the adoption and implementation of m-tech technology in the libraries reviewed. It is, therefore, recommended that the management of the libraries in consultation with the university management and ICT directorate of the Universities invest more in ICT infrastructure. The ICT infrastructure which serves as the backbone of m-tech deployment when made available will facilitate the adoption and use of m-tech for library services provision.
2. The research established that lack of policies could negatively affect the adoption and implementation of m-tech based library services in the university libraries selected for the study. In order to ensure effective implementation of m-tech based library services in these libraries, the researchers recommend that the libraries should clearly outline an ICT adoption and implementation policy that include m-tech based library services to guide the implementation and use of m-tech for library services in these university libraries.

3. The study found that the libraries reviewed as part of this research lack the human resources with the requisite skills to successfully adopt and implement m-tech- based library services. It is, therefore, recommended that these libraries put in place a program to continuously develop their human resources through recruitment and training of library staff. That is, the libraries should provide regular training for staff and the recruitment of new staff to bridge the skills gap. The IT staff should be trained and made to take further education in order to upgrade their technical skills
4. The study found that the lack of appreciation for the technology among the staff of the reviewed libraries could serve as impediment to the deployment of m-tech in the libraries. As they failed to appreciate and have a strong desire for the implementation of m-tech based library services, there are indications that university management may be lukewarm towards supporting any m-tech initiative. Library management must make a very convincing case to University management for the adoption of the technology. There should be prior consultation with stakeholders while hatching the plan of m-tech services delivery. They must seek and engage the key players to let them know what the library intends to do and possibly put up the framework for the implementation
5. Financial constraints were also identified as one of the challenges toward the implementation and use of m-tech based library services in the reviewed university libraries as part of this study. The management of these libraries were therefore urged to make a strong and convincing case for the adoption of the technology to the university management. Making a strong case to the university management and other stakeholders would help them to get the financial assistance they need. The libraries can also deploy strategies to generate funds internally. They can then use the internally generated funds in these libraries to support the running of the technology platform to ensure sustainability.

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