

# Designing a Mobile Based Library Information and Service Delivery System: A Model Plan for Libraries of Bangladesh

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## ABSTRACT

*Purpose.* The purpose of the study is to identify the need of a mobile based library information and service delivery system in developing countries, identify the services that are possible to provide with the help of mobile phones and their applications, design a mobile based library information and service delivery system, and identify major challenges regarding mobile based library information and service delivery systems.

*Design/ Methodology/ Approach.* The research is exploratory in nature. This paper is based on a review of literature, survey information, and on the author's own viewpoints. A comprehensive search of scientific literature has been done along with a survey for validating the necessity of designing mobile based library information and service delivery systems. Responses to closed-ended questions in particular on 7-point Likert scales were analyzed using the descriptive analysis techniques of SPSS 20.0 and responses to other closed-ended questions were analyzed using general statistics.

*Findings.* The research indicates that users of academic libraries, especially students and faculty members, have a positive notion regarding designing and implementing a mobile based library information and service delivery system. It also reveals user opinions regarding the possible problems associated with the design and implementation of a mobile based library information and service delivery system.

*Originality.* The paper explores mobile based library information and service delivery systems for better and faster service provision to its potential users.

**Keywords:** Mobile based library service, Information service, Service delivery, Mobile based Current Awareness Service (MOCAS), Mobile based Selective Dissemination of Information (MOSDI)

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## 1. INTRODUCTION

Mobile phones are one of the most powerful weapons in the modern world for communicating and making relationships with others. That is why both commercial and non-profit institutions and organizations use it as a medium to improve their services. The growth of mobile telephony, especially the ever-expanding growth in Asia and Africa in the use of cellular telephony has seen a number of innovations both in the technology and service delivery of mobile communication technology (Jetty & Anbu K., 2013). In every sphere of human activity the influence of mobile phones is crossing every limitation towards success. Mobile technology is becoming such an important part of the information world that it is inconceivable for libraries to stay away (Ballard & Blaine, 2013). Library and information centers of developed countries already use mobile phones and their applications in service delivery. More and more libraries are adopting existing mobile technologies to provide innovative services, as well as introducing ways for users to incorporate library services into their daily lives (Wang, Ke, & Lu, 2012).

With all the advancements in ICT and in satellite communication systems, there is no doubt that mobile applications are influencing a major change in libraries (Anbu K. & Mavuso, 2012). In Bangladesh library sectors are developing day by day. However, there is no initiative for incorporating mobile phones in service delivery systems in Bangladesh. Thus, this paper will be an immense theoretical initiative towards implementing mobile based library information and service delivery systems in Bangladesh. The rest of the paper includes a comprehensive review of relevant literature on the use of mobile phones in different library and information centers, a glimpse of the objectives that direct the study, methodology of the study, rationality of mobile based library information and service delivery systems, possible designs of mobile based library and information service delivery systems, and challenges and possible suggestions for implementing a mobile based library information and service delivery system.

## 2. LITERATURE REVIEW

Several authors (Karim, Darus, & Hasan, 2006; Herman, 2007; Hahn, 2008; Maxymuk, 2009; Walsh, 2009; Fox, 2010; Cummings, Merrill, & Borrelli, 2010; Chandhok & Babbar, 2011; Islam, 2012, etc.) have discussed the implications of mobile and smart phones in different services of the library. Karim, Darus, and Hussin (2006) explored the utilization of mobile phone services in the educational environment, explored the nature of mobile phone use among university students, and investigated the perception of university students on mobile phone uses in library and information services. The study described the current status of wireless technology. It also identified different wireless phone applications for mobile phones which facilitated and enlarged education. They also described wireless applications for library and information services. They noted that Mayer (2002) has introduced several steps through which institutions may follow in providing SMS services. The steps involved collection of mobile phone numbers, setting up a centralized SMS service center, and sending group SMS via a network. The information that can be applied in a centralized SMS includes: Reading lists (the list of the books which are in the library); Lectures, meeting schedules, exam dates; Academic information about the students; Crucial homework reminders; Web links; Urgent messaging; Announcements (thoughts/facts of the week, information about new activities, changes in schedules); and Mobile author application. All this will help lecturers/teachers/instructors/tutors to create and author their computer-based courses.

Herman (2007) described SMS as a popular way of communicating, particularly among the younger generation. However, it is important that individual libraries evaluate the appropriateness of this technology for their clientele. Herman enumerated that for Southbank Library it was a suitable technology as so many of the students use text messaging. It was felt that a large number of international students would benefit from this service. Often students with English as a second language feel more comfortable texting a question. The success of the SMS reference service at Southbank Institute Library revolves around three key points: SMS meets our clients' needs instantly; SMS is a relevant form of communication for students; and fi-

nally, the ease of providing SMS technology. The paper finds that implementing SMS reference allowed the library the opportunity to access students via a familiar, accessible service. 'SMS a Librarian' has become part of the Southbank Institute Library Ask a Librarian service, which includes e-mail, phone, and live chat access for students and staff. By adding this new technology to the reference services, users are now able to send questions and receive answers from Southbank librarians by using the text messaging facility on their mobile phones.

Hahn (2008) presented a review of selected mobile learning literature and programmatic approaches for librarians interested in developing mobile digital library services in order to equip readers with a framework for understanding and appreciating mobile digital librarianship. Hahn illustrated that M-learning as a phenomenon has been in process as unintentional progress since the late twentieth century. The unintended consequence of smaller and faster computing is the enabling of an anywhere and anytime learning. In the course of scientific discovery products are produced which have novel applications that are wholly unintentional. This is the unplanned nature of science – phenomena occur and exist before being named and investigated. Students learn through new technology before educators have inquired into their attributes. In this way we now play a game of catch-up. He stressed that applications of mobile technology enabling M-learning occur across a wide range of disciplinary space. HCI and medical informatics groups are perhaps most experimental within this domain. Innovations by these professionals will lead to service innovation in libraries. After exploring the implications M-learning means for service innovation generally, this section goes on to review mobile technology use in disparate library types: special, academic and school, and public; initiatives discussed in each are not mutually exclusive to the library group to which it belongs.

Maxymuk (2009) discussed how text messaging offers a variety of ways to stay vital and visible to younger patrons with whom libraries most need to establish a relationship to ensure the former's future. The findings indicated that even with the inherent drawbacks of message length and the incurring of charges by library users, there seems to be a place for text mes-

saging services within the library framework. Because of the portability, popularity, and pervasiveness of cell phones among our users, particularly our younger ones, this service is a way for us to stay current. Walsh (2009) illustrated that libraries are just starting to make their first steps into the world of mobile learning, in particular learning through mobile phones. The paper discussed some mobile phone functionality which could be brought into libraries, particularly using text messaging (SMS), a service available to nearly all mobile users. It focused on applications suitable for teaching, but also mentioned other services, particularly when users can take advantage of the same underlying systems as used for teaching. Elsewhere, there have been many pilots and small-scale introductory projects on mobile learning, though it has yet to reach the mainstream. Fox (2010) defined that the fabric of our lives has become interwoven with mobile technology as our day-to-day means of operating have, by necessity, become more mobile. Fox stressed that in the educational context, factors such as the increasing role of distance education enhance the need for mobile technology. This phrase "mobile technology" not only refers to the hand-held devices themselves but to the infrastructure required to support such technology. Many major Internet-based companies have tailored their services to mobile devices. The process of migrating services to the mobile world is not as straightforward as it may seem. One of the challenges is to make sure the service has the ability to communicate the maximum amount of information in the minimal amount of screen real estate and bandwidth. Fox mentioned that electronic services catering to mobile devices need to be context-aware, or "context-sensitive." He figured out several areas which need to be considered: How well would your software integrate with the device? Will the embedded browser have enough features to accommodate the content and course materials you plan to distribute? What sort of interface will the patron have, and will that interface allow for common tasks such as typing or accessing digital documents? What about power consumption? Will your content drain the battery life of the mobile device and force the patron to be plugged in, in order to utilize your services?

Cummings, Merrill, and Borrelli (2010) carried out a survey in order to better understand the nature of

handheld mobile computing use by academic library users and to determine whether there is a significant demand for using the library services with these small screen devices. They measured whether people want to access an OPAC with a small screen. The study attempted to gain a broader understanding of handheld mobile computing's impact on, and implications for, the services provided by academic libraries. The study indicated that a majority of respondents who own a web-enabled handheld device indicate that they would use small screen devices, such as PDAs or web-enabled cell phones to search a library OPAC. The increasing prevalence of handheld mobile computing devices such as PDAs and web-enabled cell phones warrants investigation as to its impact on libraries. They examined an academic library user population and the potential demand for using the library's catalog with handheld mobile computing devices for information retrieval. Parsons (2010) investigated the current habits of distance learners in higher education (HE) regarding information retrieving and mobile device use, and their attitudes for future changes to their habits. It investigated the current habits and needs of distance learners regarding information provision by academic libraries, with reference to access using mobile devices. The research aimed to discover what information students access for their education, and the various methods they use to obtain this information, with a focus on how they feel information access could be developed. Parsons identified what types of information students need to access, and in what formats they want them provided, alongside studying their current and desired use of mobile devices both for pleasure and education, in support of decision-making on the potential of mobile devices within libraries' service provision.

Lippincott (2010) mentioned that libraries have the opportunity to extend new types of services to users of mobile devices and to develop, license, or otherwise make available scholarly content that is configured for mobile devices. Ideally, libraries will become part of an institutional planning process for the development of services for mobile devices. He describes that libraries have traditionally served as a public good, providing resources and services to all, including those who could not afford to purchase some types of content or services on their own. While it is unlikely that libraries

will provide smart phones, either for use within the library or for loan because most would agree that provision of telephone service is outside the scope of library service, many libraries are already loaning a wide variety of mobile devices. For example, laptops are one type of mobile device, and many academic libraries have laptop loan programs. Some libraries also loan cameras, video cameras, MP3 or similar audio player devices, headphones, and so on. A small number of libraries are loaning Internet capable devices such as the iPod Touch. It is also possible that more departments or institutions will begin to require that students have a mobile device that can be used for a variety of purposes in their coursework. The library will want to be a part of campus discussions on such decisions so that they can ensure that library content and services will be able to interoperate with the device and platform selected.

Wilson and McCarthy (2010) reviewed one library's experiences of creating mobile services and illustrate how, by developing expertise in emerging technologies, libraries can foster partnerships with other groups on campus and play a leading role in providing relevant student-centered services. The authors provide a brief summary of mobile services offered by the Ryerson Library prior to the fall of 2008, discuss the results of a mobile device survey conducted that semester, and outline the resulting mobile services that were developed by the library which led to a campus-wide collaboration to develop the framework for a student-led mobile initiative. The technical framework and project management issues are also discussed. The paper illustrates how library services can be adapted to the mobile environment and how the library can play a role in broader campus mobile initiatives. The authors expect that all libraries will be interested in exploring the library services that were developed and adapted for mobile devices, and of particular interest to academic libraries will be the building of collaborative relationships with other academic departments to provide services to students.

Murray (2010) presented a review of selected mobile technology literature and informed librarians about the following seven mobile initiatives: Library Web Sites; SMS Reference; MOPACs (Mobile OPACs) and Integrated Library Systems; Mobile Collections; eBooks and Mobile Reading; Mobile Instruction; Mobile

Audio/Video Tours. He describes that the development and implementation of these mobile services can range from work-intensive and expensive to scalable, inexpensive solutions. The author expected that the information may be used by libraries seeking to add mobile technologies in order to enhance their traditional services, making them not only more available, but also more relevant to their users. In addition, the examinations provided, where possible, the author's recommendations for libraries seeking to implement such initiatives and suggests directions for future applications.

Bridges, Rempel, and Griggs (2010) provided an overview of the current state of worldwide mobile usage; mobile technologies; libraries' use of mobile technologies, including a review of library mobile catalog options, both vendor-supplied and in-house created; perspectives from current library leaders and innovators on the importance of incorporating the libraries' resources into the mobile environment; and future directions for mobile library services. They provided an evaluative summary of mobile statistics and resources, indicating the salient points and how to find more information for libraries wishing to draft a mobile library proposal. They presented a useful source of information for both libraries wishing to create a proposal for a mobile library site, and for libraries that simply want an overview of the current state of mobile use and technologies. Mbambo-Thata (2010) discussed issues surrounding implementation of technology in libraries. He focused on the process of implementing mobile phone services at the University of South Africa (UNISA) Library, and how the introduction impacted on internal operations. It is based on a survey of staff concerning the impact of the first six months of the service implementation. He indicated that the introduction of new services should not be simply an add-on service, but should also be followed by monitoring and evaluation of impact. Canuel and Crichton (2011) assessed how Canadian academic libraries have responded to the rapidly evolving mobile environment and to identifying gaps in the services provided, while suggesting areas for future development. They conducted an examination of the mobile content and services provided by the libraries of the member institutions of the Association of Universities and Colleges of Canada (AUCC). Based on this examination, they

described the current state of mobile librarianship in Canadian academic libraries. Examples of content and services are highlighted by them to illustrate current trends and to provide insight into future directions for developing mobile services.

Høivik (2011) mentioned that the use of mobile phones as multimedia devices and for Internet access is on the rise. With a global average of more than 60 cell phones for every 100 individuals, some countries like Taiwan and The Netherlands have more mobile phones than they have inhabitants. He identified that in poor areas of the world, there is a growing trend that several individuals share access to one phone. This has economic repercussions as the phone system becomes a vehicle for monetary transfers in addition to traditional and new forms of information exchange. He mentioned in the year 2009 for the first time ever, mobile phones were used more for accessing data than to make calls. Paterson and Low (2011) provided quantitative and qualitative data on students' use of mobile devices and consider the benefit of academic mobile library services to students. The findings of the research indicated that the dramatic growth of smartphone ownership among students in an eight-month period was surprising: a 17 percent increase between March and November 2010. In addition, 68 per cent of students who plan to change their mobile handset would upgrade to a smartphone. The paper provided evidence for libraries to determine the value of developing their own mobile services. It also demonstrated the proliferation of mobile device usage within the university and library context and indicated which services students would find most useful on a mobile device.

Murray (2011) presented a general review of free or inexpensive methods of implementing the following mobile services in libraries for retrieving required information: Library Websites, Short Message Service (SMS) reference, and Mobile Online Public Access Catalogs (MOPACs). Murray concluded that libraries with tight budgets should approach their mobilization project in terms of stages, developing content and services sequentially from passive formats, which require little input, to more dynamic items, which entail greater interaction. Wang, Ke, and Lu (2010) described different methods used in the library for information retrieval by using mobile devices. They

showed that the usage of the two services improves the information retrieval, average number of overdue occurrences, average amount of overdue fines, average amount of overdue fines per transaction, and average overdue rates; furthermore, the use of the services also indirectly increases the number of items borrowed by patrons. Nowlan (2012) mentioned that with the increase of mobile technology availability and the demand for accessible mobile content, it is imperative that libraries examine how they can provide services to their patrons within this medium in order to continue to provide valuable services and make information retrieval easier for their clientele or users. He stressed that mobile technologies are constantly changing, so continuous assessment in this area is of importance. He determined how students at the University of Regina would like to interact with the library on their mobile devices and how to best construct a mobile site to suit the university community's information retrieval needs.

Ballard and Blaine (2012) described a full-service mobile phone application so that users could search the catalog, access the reserves module, renew books, and retrieve information such as library hours, library administration, library workshops, and programs. Chandhok and Babbar (2011) provided a brief overview about different mobile technologies that are helpful in providing library services and information retrieval. They mentioned some mobile library services through which information access and retrieval will be improved for the potential users of the library. Islam (2012) stated that the world is fast becoming a global village and a necessary tool for this process is communication where telecommunication is a key player. Over the past decade, the expansion of mobile cellular networks and popularization of mobile phones have been driving growth in information and communications technology (ICT) in Asia and the Pacific, and the world.

The above review of literature indicates that many studies have been conducted throughout the world from different point of aspects of using mobile phones for better service delivery and as well for improving the overall performance of a library. But there is a gap of literature about mobile based library information delivery in the libraries of Bangladesh.

### 3. OBJECTIVES OF THE STUDY

In the past libraries were collections of books, manuscripts, journals, and other sources of recorded information. However, along the years, traditional libraries have changed into digital and virtual ones where users can access the vast collections of information remotely, using various computer information technologies (ITs). The most recent technological innovation is the term mobile library (Aharony, 2013). Thus, the main objectives of the study are as follows:

1. To identify the need of mobile based library Information and service delivery in Bangladesh.
2. To identify the services that are possible to provide to users with the help of mobile phones and their applications.
3. To design a mobile based library information and service delivery system.
4. To identify major challenges regarding mobile based library information and service delivery systems.

### 4. METHODOLOGY OF THE STUDY

This research is exploratory in nature. The paper is based on the review of literature and on the author's own viewpoints. A comprehensive search of scientific literature with the phrases "mobile library," "Mobile based retrieval system," "Mobile services for libraries," "mobile phone application in libraries," "mobile phone for library services," "mobile library," "library services," "mobile services," "present state of art of mobile usage," etc., published in books, journals, online sources, and so on is conducted. A qualitative content analysis of relevant literature is made to address each of the above objectives. A survey has been conducted to validate the necessity of designing a mobile based library information and service delivery system for Bangladesh. A total of 165 questionnaires were distributed among students and faculty members. Among them 130 filled-up questionnaires were collected. This shows the response rate is 78.7%. For conducting the study 110 questionnaires have been selected and the rest have been rejected due to incomplete or monotonous answers. The sample of this study includes 85 university

students and 25 faculty members who have expertise on mobile applications for library service delivery. The SPSS tool has been used to analyze the data. Responses to closed-ended questions in particular on 7-point Likert scales were analyzed using the descriptive analysis techniques of SPSS 20.0 and responses to other closed-ended questions were analyzed using general statistics.

## 5. WHY MOBILE BASED LIBRARY INFORMATION AND SERVICE DELIVERY

The world is fast becoming a global village and a necessary tool for this process is communication, where telecommunication is a key player. In Bangladesh the total number of mobile phone subscribers now has reached 131.376 million by the end of June 2016 (Btrc.gov.bd, 2016). At present, there are six mobile phone operators providing mobile phone services in Bangladesh (Islam, 2012). The following are the levels of agreement regarding the possible advantages of using mobile phones for library information and service delivery from the students and faculty members.

The students and faculty members were asked to indicate their level of agreement regarding the possible advantages of using mobile phones for library information and service delivery. These agreements were measured on 7-point Likert Scales in Table 1; mean and standard deviation were calculated according to the following scores: 1=strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither agree nor disagree, 5=somewhat agree, 6=agree, 7=strongly agree, using the descriptive analysis technique of SPSS 20.0.

### 1. Enhance ability to retrieve information from anywhere

Table 1 reveals that the students and faculty members somewhat agree with a mean score of 5.28 on 1-7 Likert scales. It shows that the student and faculty members think that using mobile phones will enhance ability to retrieve information from anywhere.

### 2. 24/7 hrs./days retrieval facility

From Table 1 it is clear that the students and faculty members somewhat agree with this statement with a mean score of 5.34 on 1-7 Likert scales. It indicates

that the students and faculty members believe that by using mobile phones they can retrieve information 24/7 hrs/days.

### 3. Enhance IR skills

The students and faculty members somewhat agree with this statement with a mean score of 5.13 (Table 1). It indicates their support for this statement that implication of mobile phone based IR will enhance information retrieval skills.

### 4. Support distance learning

Table 1 reveals that the students and faculty members somewhat agree with a mean score of 4.95 on 1-7 Likert scales. It shows that the student and faculty members think that using mobile phones will support distance learning.

### 5. Promote information literacy

From Table 1 it is clear that the students and faculty members somewhat agree with this statement with a mean score of 5.14 on 1-7 Likert scales. It indicates that the students and faculty members believe that introducing mobile phones for IR will promote information literacy.

### 6. Fast information retrieval

Table 1 reveals that the students and faculty members somewhat agree with a mean score of 5.29 on 1-7 Likert scales. It shows that the student and faculty members think that introducing mobile phone based services will make information retrieval faster.

## 5.1. Designing a Mobile Based Library Information and Service Delivery System

According to current statistics, there are 5.3 billion mobile phone users on the planet. That is 77 percent of the world's population (Ballard & Blaine, 2013). Mobile devices and applications provide access to information in the comfort of people's homes and offices, using their cellular phones or personal digital assistants. These new devices enable access to information without the limitations of space and time (Aharony, 2013). Mobile based library information delivery patterns refer to the services and information of the library that are possible to be delivered to the respective users of the library through the use and application of mobile

**Table 1.** Level of Agreement Regarding the Possible Advantages of Introducing Mobile Phones in Library Information and Service Delivery Systems

Statements	Students					Faculty					Avg. Mean
	N	Min.	Max.	Mean	Std. Deviation	N	Min.	Max.	Mean	Std. Deviation	
Enhance ability to retrieve information from anywhere	85	1.00	7.00	4.91	2.01	25	1.00	7.00	5.64	1.84	5.28
24/7 hrs/days retrieval facility	85	1.00	7.00	5.00	1.86	25	1.00	7.00	5.68	1.52	5.34
Enhance information retrieval (IR) skills	85	1.00	7.00	5.02	1.49	25	1.00	7.00	5.24	1.27	5.13
Support distance learning	85	1.00	7.00	4.77	1.74	25	1.00	7.00	5.12	1.48	4.95
Promote information literacy	85	1.00	7.00	5.16	1.34	25	1.00	7.00	5.12	1.62	5.14
Fast information retrieval (IR)	85	1.00	7.00	5.13	1.72	25	1.00	7.00	5.44	1.32	5.29
Valid N (listwise)	85					25					

phones. In Bangladesh, mobile phones have become an important element of pilot and live programs across multiple urban development sectors. Primarily they are an aid for data collection, voice calls, information dissemination, time savings, decision making, data accuracy, and so on (Islam, 2012). The following library information and services can be delivered using mobile phones and their different applications.

**a. Freshmen orientation notification:** A new member of a library may be termed as a freshman. A freshman would not be familiar with the ways of that library. He or she would not know about the rules, regulations, and services of the library (Kumar, 1994). In that case freshmen orientation can be a great way to attract the user towards the library and education.

There can be two ways of orientation:

- *In-house orientation:* In-house orientation refers to welcoming users and introducing them with library systems and services, rules, and regulations within the library environment through library visits. In in-house orientations, mobile phones (i.e. SMS) can be used as a tool for notifying users of the library about the orientation time, place, location, and attendees(see Fig. 1).
- *Direct orientation:* Direct orientation refers to the

process through which the users will enjoy all the orientation facilities without attending the program physically. This direct orientation includes information like a welcoming message and general information about the library, like opening hours, closing hours, closed days, location of the library, general library services, and so on. This can be done through SMS and MMS(see Fig. 2).

**b. Mobile-Based Current Awareness Service (MOCAS):** The purpose of a current-awareness service is to inform users about new acquisitions in their libraries (Britannica, 2014). The process of MOCAS can be described in the following manner:

- *Subscription to MOCAS:* The first stage in Mobile based Current Awareness Service (MOCAS) is to subscribe to it. For example, to subscribe to the CAS the user needs to write ‘On CAS’ and send the message to the number 1000 from his/her mobile (Islam, 2012).
- *Confirmation message:* In the second step a confirmation message will be sent to the user or the library member’s mobile (Islam, 2012)(see Fig. 3).
- *MOCAS delivery:* After the successful completion of the MOCAS, the service provider of MOCAS will send current services (i.e. lists of new acqui-





Fig. 1 Sample mobile based in-house orientation system

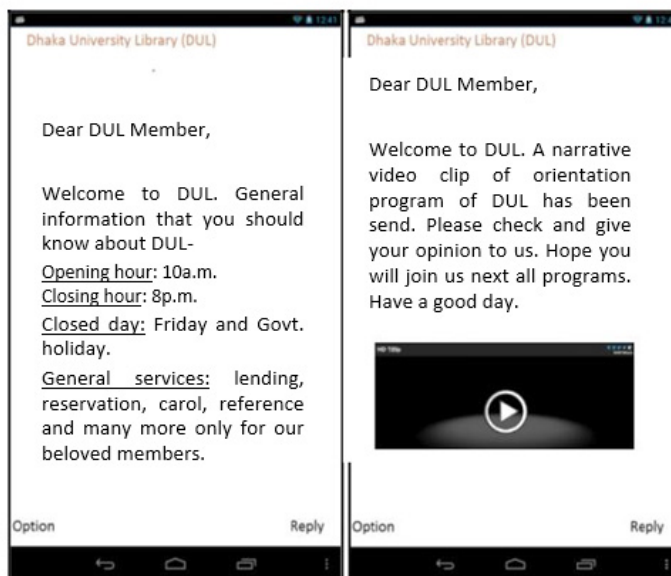


Fig. 2 Sample mobile based direct orientation system

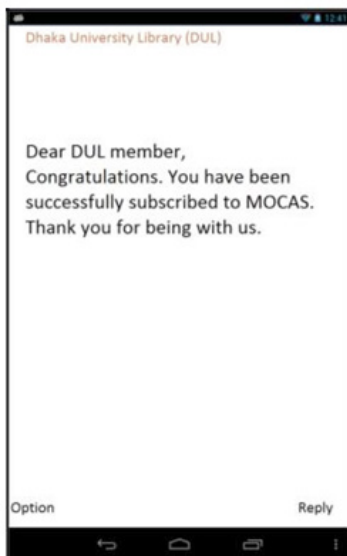


Fig. 3 Confirmation message for MOCAS

sitions, bibliographies, indexing and abstracting services, tables of contents of periodicals, etc.) regarding the library to the users(see Fig. 4).

*c. Mobile Based SDI Service (MOSDI):* Luhn (1958) defines SDI as a service within an organization which concerns itself with the channeling of a new item of information, from whatever sources, to those clients within the organization where the probability of usefulness in connection with current work or interest is high (Hossain & Islam, 2008)(see Fig. 5).

This figure illustrates that when a new member takes membership in the library, it will be sent and stored in the library database. Then a library user profile will be created. From this user profile, keywords of users' subject interests will be selected. In the same way, when any document or piece of information arrives at the library it will also be sent and stored in the library server and from this, keywords from the document will be generated and stored. Then both of these keywords will be automatically compared by the computer program and if any similarities are found, it receives the document call number and user contact number from the server and automatically generates a message to the user mentioning the bibliographical information

about the document.

*d. Mobile Based Circulation System (MOCS):* The library circulation services that are possible to be provided to users with the help of mobile phones are:

- Borrowing library items
- Reservation of documents
- Renewal of documents
- Registration for carol service
- Reminders about loaned library items

For all these services the user will need to register with this system. The user needs to send an SMS “register to MOCS” to the authorized library number. The library server then sends feedback to the user that he/she is successfully registered in the system. For borrowing documents, the user just needs to send an SMS which includes the title “BORROW,” then his/her ID and document ID. If he/she wants the document sent to a place, then a charge for sending the document will be charged from his/her mobile balance. Otherwise, it will be reserved for him/her and within two days he/she has to collect the document from the library personally. For this he/she has to send an SMS by using the keyword “RESERVE.” In the same manner the library member can renew the documents by sending a

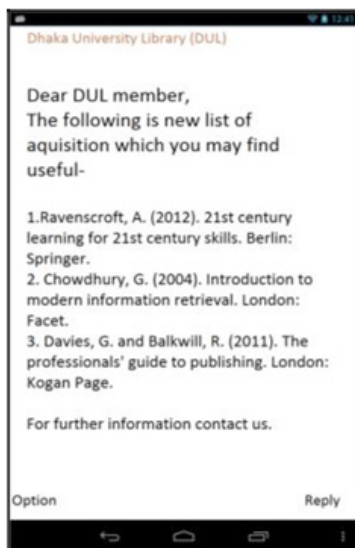


Fig. 4 Delivery of MOCAS

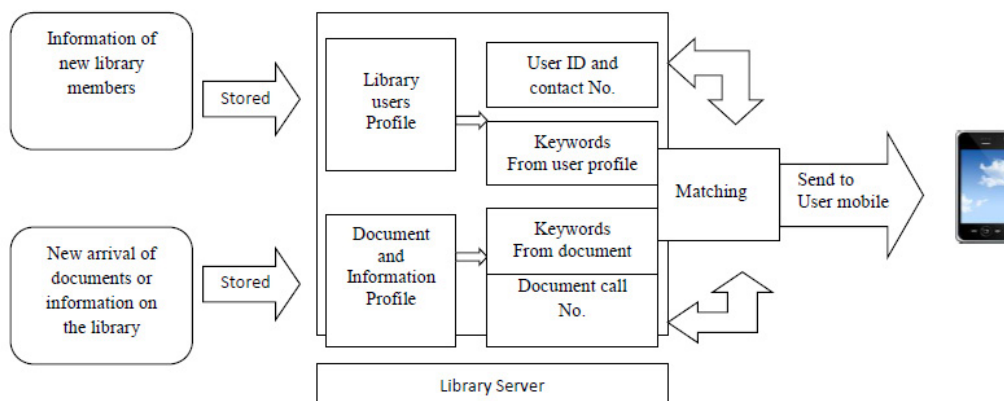


Fig. 5 Mobile based SDI (MOSDI) service architecture

SMS using the keyword “RENEWAL.” Again, for carol service the users will send an SMS to a library authorized number by using the keyword “RE\_F\_CAROL.” In the circulation system, when the date of borrowing the item is finished the library server will automatically generate a message to remind the library member

about the borrowed item.

*e. Mobile Based Ready Reference Service (MORRS):* According to Ranganathan (1961) ready reference service is a reference service finished in a very short time, in a moment if possible. Examples of questions which fall under ready reference services are:

- What is the definition of information management?
- What is the distance of Mount Everest? (Kumar, 1994)
- What is cataloguing?, etc.

First the user needs to subscribe to the service by sending an SMS to an authorized number including the keyword "Subscribe MORRS." After successful completion of the registration, the user can use the service. The reference librarians will be always alert and by the use of computers and Internet and other reference materials they will serve the user with the least possible time. If the user is not satisfied with the answer he/she can again ask the question for clarification.

## 5.2. Challenges toward Implementing a Mobile Based Library Information and Service Delivery System

Since Bangladesh is a developing country there are so many associated problems, so it is very difficult to implement a proper system. The following are some major challenges retrieved from the survey results from students and faculty members in implementing a mobile based library information and service delivery system:

- Inadequacy of funds has been always a "big issue" for developing nations like Bangladesh. The government has limited reserves, so it is very difficult for them to fund any project.
- The awareness among people about the importance of the library and its services is around zero. People are not even thinking of developing it.
- "Red Tapism" in all government sectors hinders the possible growth of mobile based library information and service delivery systems.
- Without proper qualification the library staff are appointed. As a result, they do not understand the ethics of this noble profession and thus users suffers from lack of service.
- For implementing mobile based library information and service delivery all the users of the library must use smart phones for receiving faster and better services, which can be a great challenge for implementing this system in the libraries of Bangladesh.

- Lack of motivation among professionals towards the development of library and information services.
- The lack of overall infrastructure that is required for implementing the system.
- Lack of knowledge of the modern tools and technologies among the staff of the library.
- Lack of training facilities for professionals.
- Fear of innovation among the library staff is another big hindrance for implementing a mobile based library information and service delivery system.

## 6. RECOMMENDATIONS

The following recommendations have been quoted from the survey that reflect what measures should be adopted to eliminate the hindrances regarding implementing a mobile based library information and document delivery system:

- Highly qualified, competent, and innovative professionals should be appointed to libraries.
- The lowest possible cost should be adopted by the libraries for implementing a mobile based library information and service delivery system.
- Adequate budgets should be sanctioned for implementing a mobile based library information and service delivery system.
- Library administration should be more dynamic to embrace mobile based library information and service delivery systems.
- Awareness among the library professionals and users is needed to implement such a type of project.
- Innovative ideas and plans should be rewarded and encouraged to motivate staff and professionals.
- Changing mentality with changing needs and recent trends should be adopted for being up to date with the global environment.

## 7. CONCLUSION

Many academic libraries are experimenting with various types of reference services for users of mobile devices, but fewer are thinking of the potentially dramatic changes that the uptake of devices with sophisticated capabilities may have on their user community

and more specifically on the use of digital information resources (Lippincott, 2010). It is no longer enough to offer better content; in the mobile environment usability plays a significant role in which sites or services mobile users patronize (Bell & Peters, 2013). Thus, this study takes an initiative to design a mobile based library information and service delivery system design for the libraries of Bangladesh, especially for academic libraries. This study is a basic and real attempt from the author's own point of thinking regarding the development of library services and practices through the use of mobile phones.

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