Digital Library Development and Its Issues in Sri Lanka：
Review of Literature

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要　　旨

　本稿の目的は、スリランカの大学図書館においてなされた ICT 導入のプロセスを提示すると共に、大学図書館がデジタル化とデジタル図書館に対して、いかに着手したかを明らかにすることである。さらに、これらの導入において問題にされてきた内容を明らかにする。先行研究においては、スリランカの大学図書館について完成したデジタル図書館を取り扱った文献はなかったが、実際には、現在、デジタル図書館 と主な図書館の収蔵品のデジタルコレクションについて使用可能である。スリランカの大学図書館におけるデジタル図書館の進歩は、今なお途上にあることがわかる。予算分配の不十分さ、スタッフの熟練度の低さ、インフラ整備の欠如、マネジメントに対する関心の低さが大学図書館のデジタル図書館の進歩にネガティブな影響を与える問題である。本稿では、大学図書館におけるICT の導入、デジタル化、デジタル図書館に関する始まりの時期から現在までを年代史的に解説する。

Introduction

　　　　The current world is going through an information technology revolution that has drastically changed many facets of the human life, from education, industry, economy and politics to entertainments. In addition to that unparalleled capabilities of the information technology to process, store, refine and disseminate data and information knowledge in a variety of ways across geographical boundaries had dramatically changed the ways in many sectors which public and private sectors of all over the world[1]. Libraries are now extending their traditional roles to new information communication era. Information

Communication Technology (ICT) is an indispensable part for modern libraries. This technology has been adopted by the libraries in carrying out services on information services to their users. They are trying to cater users by facilitating individual enrichment through providing low cost or free computer access to online resources. Based on current development of ICT, users can access, assess and use of information effectively and efficiently. As a result of information transformation, developing countries are endeavoring to accomplish goals like developed countries. In this paper discusses how Sri Lankan University library system initiates information communication technologies and develop digital libraries as a developing country. This paper is specifically focused on introduction of electronic information resources into University libraries and how University libraries started digitization and digital libraries. Finally, this further more discusses issues which Sri Lankan University libraries are facing in relating to digital information handling.

Introduction to ICT in Education & Higher Education

The Sri Lanka educational environment is undergoing a phase of rapid transformation with adoption of information technology at various levels. After 1983, the Ministry of Education and Higher Education in Sri Lanka took steps to familiarize and encourage school children in the use of information technology. Initially, computers ware provided to some schools in 1984, later in 1994 Computer Resource Centers were set up in a number of schools with the assistance of the Asian Development Bank with the purpose of providing basic computer literacy education to students during their vacation periods[2]. But a significant impact was not observed as expected from these activities, therefore, National Policy on Information Technology in School Education (NAPITSE) was prepared by Ministry of Education and Higher Education. The policy includes six year strategic plan and focusing on two strategies which is use of Information Technology (IT) in education and use of IT in management of the education system. As a result of NAPITSE, a subject called General Information Technology was introduced to the school curriculum after 2002. At the end of year 2003, 400 schools in island wide received ICT facilities with 10 computers each other accessories with Internet facilities under the World Bank funded project[3]. After that the ministry of Education is currently taking several measures to enhance IT facilities in schools.

After national policy on information technology was made, several recommendations to enhance IT in higher education sector. University education includes IT awareness programme for all undergraduates, establishing campus wide networks in all Universities and providing Internet access to all and introducing

computer science courses[4].　These are being implemented in all universities throughout the country at various levels. As examples University of Colombo, University of Moratuwa, Open University of Sri Lanka started IT courses at the beginning and later it was expanded to other Universities. Universities experienced the importance of information technology and the e-learning in this era, thus providing facilities to University students to make the potential benefits of IT.

At the same time a group of Sri Lankan volunteers through the project "Lanka Educational Academic and Research Network (LEARN) provided first email service in Sri Lanka connecting Sri Lankan Universities and research institutions via the department of computer and information technology council (CINTEC) and the Lanka Academic Network(LAcNet). Later it was expanded to provide dedicated Internet connections and was managed by the LEARN management committee appointed by the University Grants Commission (UGC) [5].

Introduction to Information Technology and Electronic Information Resources in University Libraries

After the introduction of information technology to Universities, University libraries also were supported to implement and set up necessary network and infrastructure through the installation of required hardware and software and also by way of providing ICT training[6]. In 1986, there was a turning point for University library history which was the first meeting of automating University libraries. In that meeting Inter University Committee on Librarians (IUCL) accentuated the importance of automating University libraries in order to be par with the other University libraries in the world. In 1991, UGC provided one micro computer to each eight University libraries to fulfill the ground level work of automation[7].

At the meantime, UNESCSO developed CDS/ISIS which is advanced non numerical information storage and retrieval software which operates by combining its own computerized documentation system with an intergraded set of information systems of the International Labor Organization. It has been introduced to the Sri Lankan University libraries. After the introduction of CDS/ISIS there had been a rapid progress of library computerization activities in Sri Lanka. After obtaining CDS/ISIS university libraries had started to create their catalogue using CDS/ISIS. This was the first step that University libraries had taken to automate

their library collections[8]. Similarly in that period; National Science Foundation has provided a notable service to the libraries and librarians by promoting and providing training and introducing upgrades. At the beginning a very few libraries tried to automate the their library functions and library automation stagnated for several years until leading university libraries boosted their mission to achieve the full potential of library automation for the sake of their users[9]. At the initial stage the most important decision had to take by librarians to select the appropriate software for automation. Without prior experiences and demanding circumstances three different library automation software packages were selected by University libraries. Alice for Windows was selected by University of Peradeniya, University of Colombo, University of Sri Jayawardenapura, Open University of Sri Lanka and Libsys was selected by the University of Moratuwa while Libsuite was chosen by University of Kalaniya. University of Ruhuna created its own integrated library management system by using open source package of KOHA[10].

During that time, SIDA (Swedish International Development Cooperation Agency) library support program has started to support Sri Lankan University libraries towards subscription to online databases during the period of 1992-2002 with the collaboration of British based organization International Network for the Availability of Scientific Publications (INASP). This was second turning point of Sri Lankan University library development into electronic information world. This program supported access to fresh international research results presented in international scientific journals and electronic information resources as well as provides an opportunity to make research done in Sri Lanka available to the world. Another program called PERI (Programme for the Enhancement of Research Information) was developed during 1999/2000 by INASP. One basic aim of that program is to collaboration, enhancing access to information and promoting in country capacity building in production, organization and dissemination of information and knowledge of Sri Lanka. In year 2005, INASP negotiated countrywide licenses for full text e-information with access to over 5000 full text online journals in science, technology, medicine, social sciences and humanities. The beneficiaries from this endeavour are for all university academics in Sri Lanka and also other higher educational, research and non-profit making institutions[11].

Initiating digitization and Digital Libraries in Sri Lanka.

Presently in Sri Lanka, digitization and digital libraries are most concerned task in the library and

information science field. Sri Lanka has been a cradle of indigenous knowledge and culture alongside for thousands years. As developed countries, several libraries in Sri Lanka have taken steps to digitize their library materials to increase user access to their library collections[12] [13] [14]. As a primary step of creating digital libraries in university sector, University of Colombo took a main role to train university librarians with the collaboration of INASP in year 2009. Training was given in India with the participation of Indian universities. Selected University librarians had been received Indian training and they are expected to implement digital library system for each University libraries.

According to recorded literature, initiated digitization projects of Sri Lankan libraries are limited. As a focal point of national information, National Library & Documentation & Services Board of Sri Lanka has initiated to provide information via electronic to users and researchers in Sri Lanka and to the world as a national body. According to Gangabadadarchchi & Amarasiri (2006) digitization project has started by National Library of Sri Lanka (NLS) in 2005. The purpose of initiating this project was to enable users regardless of location to directly access and use digitized materials relating to Sri Lanka and Sri Lankans. Further to increase access to help and to preserve rare and fragile collections by providing digital surrogates and facilitates exchange of information with other institutions and collaboratively build a critical mass of digital items in particular subjects"[15]. For the dissemination of digital information to Sri Lankan users as well as outsiders in Sri Lanka National library formulated policies when they started digitizing of collection. According to the policy of NLS, the highest priority has given to manuscripts relating to Sri Lanka and created by Sri Lankans as they are unique to Sri Lanka. In the first phase of the digitization, folklore collection which contains books, journals, news paper articles, manuscripts, CDs, audio tapes had been selected for the digitization as they are unique and rare and they resonate the Sinhalese culture and indigenous knowledge. However, palm leaf manuscripts and old gazette collections are to be digitized in future. Digitized collection can be accessed via NLS intranet and bibliographic records can be accessed via NLS webpage. NLS is planning to have a database for digitized collection and will connect some items to the web according to the copyright law of Sri Lanka[16].

After receiving technical and human resource trainings of digital library, initiating and development projects had been increased in university libraries in Sri Lanka after 2009. Many University libraries initiated digitalization projects with the mission of full- fledged digital libraries. University of

Peradeniya has taken steps to initiate digital library while automation is going on of university library network. According to Dissanayake & Rajapaksha (2012) creating institutional digital repositories are the current trend in Sri Lankan University libraries, because Universities in Sri Lanka are at a competitive stage to upgrade their national University rank in web metrics. Therefore, most specifically Universities are paying attention to create their institutional repositories to enhance their service as well as create a wider user access. According Dissanayake et al Peradeniya University library had started to create their institutional repository as a project of Information Technology unit. After the pilot tests, database was created using D-space in Linux platform. According to the permission given by the University authorities, University copyrighted documents were deposited in to the repository. University research publications, abstract of University thesis, Academic staff members research publications were inputted to the digital library as an initial stage. Some challenges were encountered while doing the project such as locating time to work on the project during normal duties, absence of additional staff to enter metadata and to digitize the material. The academic staff was reluctant to submit their papers to the digital repository were one of major problems encountered by the library[17].

Similar to the University of Peradeniya, University of Moratuwa library also implement a project of electronic thesis and dissertation (ETD) to serve worldwide user clientele for accessing technological innovations of the Sri Lanka. Moratuwa University library has around 2000 thesis which belongs to the university students' research outputs. According to Gamage & Kumara (2011) library started ETD project with the approval of thesis guideline from the University administration. At the same time, the University Senate cleared definitions for the terms of 'Theses' & 'Dissertations' for University of Moratuwa. Accordingly, a consensus was reached to consider all submissions for Masters Degree and below as dissertations, and MPhil degree and above as theses. All academic departments and the library came in to an agreement from 2011 each thesis should submits print copy along with e- copy to the library. Thesis will be hosted on a server for free and open access for user community. Moratuwa University digital library also applied D-Space software application and two external consultants and audio visual technical officer are being employed for that project. At the beginning retrospective conversion was done as scanning documents, OCR (Optical Character Recognition) copying text and creating new file with a customized watermark. Some issues and failures were encountered during the project such as some repetitions in uploading scanned documents to the server, adhering to OAI-PMH (Open Archives Initiative- Protocol for Metadata Harvesting)

and thereby making the collection searchable in Google, final customisations in the user interface Currently, 2000 abstracts and title pages of thesis & dissertations and other conference papers and publications are available in Moratuwa University for online access[18].

Another mass digital library project has started in Palm Leaf Manuscript Study and Research Library at Faculty of Social Sciences in University of Kalaniya, Sri Lanka in 2011. It is a digital library project of Palm Leaf Manuscripts found in Sri Lanka through digitization and provides access to them in order to facilitate study and research in the sphere of manuscript culture. It digitizes all types of palm leaf manuscripts irrespective of their subject coverage and thud serves as a home for traditional national knowledge. Since ancient times, palm leaf was the main writing material in Sri Lanka, mainly Buddhist sacred scripts (Tripitaka) and related literature as well as works on other subject fields such as medicine, art and crafts were committed to writing on palm leaves. At the beginning digital collection covered Buddhist sacred scripts of *Pathemokka,Digha Nikaya, Hatha Vangalla Vihara Vamsa, Sutra Ekathuwak, Abhidharama Sangaraha tika* etc... The library expects to be the centre of excellence on traditional national knowledge contained in palm leaf manuscripts through the creation of a digital library devoted to collect, preserve, study, research the palm leaf manuscripts in Sri Lanka irrespective of their subject content[19].

Not only University Library arena, but also special libraries are taken steps to initiate of digital library in their specified fields. National Science Library & Resource Centre of the National Science Foundation (NSF) is the national focal point for the dissemination of Science and Technology (S &T) information in the country. Recently NSF launched a national program to develop a Network of Institutional Repositories across the country coupled with a digitization program. The program commenced in 2012 and will be continuing over five year period under the leadership of the NSF. This program supports and promotes setting up digital repositories at each University libraries and research institutes. NSF is one of institutes provided with the training programs technological support to develop and implement digital libraries in Sri Lanka. One of aims of NSF provides financial facilities, bear the full cost of digitized local literature collections, provides training to staff on administration and maintenance repository and also supports conversion of information the existing databases too. As a national institute, NSF plans to form a national team of institutional repositories at each institution and University and expects to attend any trouble- shooting requirements. The National repository of NSF serves as a central point of the science and technology libraries.

At present NSF is providing free full text access over 3000 NSF copyright own materials and 09 other locally published journals. NSF repository consist journal articles, theses and dissertations unpublished reports, books, chapters and sections, multimedia and audio visual materials, objects, patens, ancient writings, statistical information etc…[20].

Survey Studies

Though digitization projects have been started in several University library projects have been limited into thesis and dissertations, journal articles and institutional publications and science and technology reports etc... [21] [22]. According to the survey done by Pushpakumara(2007) only 53.8% of University libraries and 42.9%   of special libraries in Sri Lanka were involved in some kind of digitization activity. Further, 26.9% of University libraries were planning to involve in digitization practices in year 2008 and 7.7% of others are planning to be involved in future. 28.6% of special libraries are willing involve in digitization practices in the next year and 21.4% beyond next year. Survey findings revealed that libraries need to have some kind of necessary technology and trained staff members to start digitization practices. The significant obstacle for digitizing library material in Sri Lanka is the lack of funds. As Sri Lanka has vast and rich collection of indigenous knowledge, authorities should pay attention to digitize such a national heritage and sustain the present efforts and continue digitization activities[23].

Another survey has been conducted by Gamage in 2013 which discusses about the digital library initiatives in University libraries in Sri Lanka. This study covered 38 university main libraries and their branch libraries. Responses are given by 31 librarians out of 38 libraries. According to the study results:

- There are no separate digital libraries in University libraries in Sri Lanka.
- There are 45% libraries have digital collections   to support main collection such as e journals, e-books , books on CDs online data bases etc.
- There are 36% of libraries have taken steps to initiate DLs
- 19% of libraries have not taken to initiate digital library.

Table 01: Current status of digital library initiative in University libraries in Sri Lanka

Category		Response No.	Percentage (%)
A	Has a separate digital library.	0	0
B	Has a digital collection to support main collection.	14	45.0
C	Steps have been taken to initiate digital library.	11	36.0
D	No steps have been taken to initiate digital library.	06	19.0
	Other	0	0
	Total Sample	31	100.0

Source: Gamage, C. 2013."Digital Library Initiatives in University Libraries in Sri Lanka". In : Felicitation volume of Prof. Jayasiri Lankage, Godage Publishers: pp 502: Table 1. Percentages of the current status of digital library initiatives in University libraries in Sri Lanka.

According to Gamage, currently there is no separate digital library system available in University libraries in Sri Lanka. However, a majority of University libraries have digital information resources or digital collections which supported to main collection. Electronic collections including institutional digital libraries are available to serve for a user clientele. According to the survey results, 42% of libraries initiated to develop CD ROM collections and 19% of libraries subscribed online databases in category of "B". Library category "C" indicated that 29% initiated to develop CD ROM collections and 26% only subscribe for online databases.　6% libraries initiated to digitize special collections and 6% libraries initiated to digitize other collections. Only 3% of libraries are initiated to digitize rare collections. As a summary only 71% of libraries developed CD ROM collections and 45% libraries have subscribed for online databases, 6% libraries digitized special collections while 6% libraries provide access to other collections. Minimum focus has been given to digitize rare collections in university library sector in Sri Lanka[24].

Table 02: Digital library initiatives in university libraries in Sri Lanka

Category of the library		Special collection (%)	Rare Collection (%)	CD Rom(%)	Online Databases(%)	Other (%)
A	Has a separate digital library	0	0	0	0	0
B	Libraries with digital collection to support main collection	0	0	42	19	0
C	Libraries which have taken steps to initiate digital library	6	3	29	26	6
D	Libraries with no digital library initiatives	0	0	0	0	0
E	Other	0	0	0	0	0
	Total	6	3	71	45	6

Source: Gamage, C. 2013. "Digital Library Initiatives in University Libraries in Sri Lanka". In : Felicitation volume of Prof. Jayasiri Lankage, Godage Publishers: pp.503 : Table 1. Percentages of the current status of digital library initiatives in University libraries in Sri Lanka.)

The most popular software used to create digital library collections are D Space and Green Stone in University libraries. These software programmes are open sources ones which can be downloaded free while user customization facilities are available[25] [26]. WINISIS, ACROBAT, OMINIPAGE Green stone software had been used to initiate digital library in special libraries[27]. The strength of Digital collections of University libraries are pass papers (13%) e books, academic journals and journal articles 10% and

institutional publications (3%) and provide links to access digital resources (6%). It is note that digital collections in university libraries currently developing and upgrading task. It is clear that digital libraries and digital collection development in Sri Lanka is lagging behind compared to other developed countries.

According to Gamages` study (2013) there only 55% of University libraries have skilled staff in all library categories. Available skilled staff includes a majority of professional staff and pare professional staff to engage in the digital library initiating projects. Facilities and infrastructures are essential for initiate digital libraries[28]. University libraries are encoding to increase their IT facilities and infrastructure to initiate digital library projects. Survey results of Gamage (2013) showed that majority of responded libraries have over (70%) computer and printers and over 50% of libraries have scanners and servers to be used to in digital library activities in university libraries. As available infrastructure facilities majority of libraries (Over 80%) have internet facilities, around 50% of libraries have separate units and furniture. Only one third percentage (1/3) has air conditioning facilities for these activities[29]. According to Rathnabahu(2011) only 20% of special libraries have online access facility. But majority of special libraries had only off-line access facility to their digital collections[30].

Issues encountering of digital library development in Sri Lanka

Some major constraints hindering digital library development efforts in University libraries can be identified through available literature. Based on prevailing literature some issues were discussed as follows Ranasinghe(2008) discussed about the issues of digital library content in South Asian region which applied to Sri Lanka digital library context too. According to that digital library content in South Asian region is limited to data and information, knowledge has not become the main component of their content yet. Digital library contents of these libraries are unprocessed data information, information of various topics, bibliographical surrogates and minimum of full text articles and e-books. Thought these countries have numerous rich traditional cultural heritages since over the centuries, digital libraries are not able to present that knowledge to end users properly. The issues are relating these; limited to few scanned copies of books and other documents in national languages, no indexing of the content of such documents has been done. These libraries are facing difficulties of digitization of vernacular languages, lack of funds for digitization projects, lack of IT professional competencies, and less priority for digital libraries among other burning issues[31].

Rathnabahu (2011) and Gamage (2013) also discussed the obstacles relating the digital library development in University libraries in Sri Lanka. According to them, there are a number of reasons are affecting the dawdling development of digital libraries in Sri Lanka. One major reason is the lack of budget allocation. Survey results of Gamage (2013) showed that 93% of libraries reported that lack of financial support is a one of major barriers to develop rapidly like in developed country University libraries. Presently, the main funding source for University libraries is the ministry of higher education and government of Sri Lanka. But budget allocation is decreasing by year and year and there is no separate allocation for develop digital libraries. All activities have to manage with the normal allocation including print and electronic purchasing and other services. Some projects were initiated with the support from international donor agencies e.g. INASP, CIDA, HITECH, HELLIS, however, these are given modest support to reach the mission. Due to this shortage of government funds, University libraries are still unable to reach their full fledged the information repositories in Sri Lanka[32] [33].

Even though Universities have trained staff of ICT, there are significant number of staff members who don't have strong ICT skills. Without a qualified and knowledgeable staff of ICT and digital library area, it is not possible to build a digital library system and manage its electronic system. According to Gamage survey results shows that around 58% of University libraries are affecting lack of skilled man power for initiating and develop digital libraries. Gunawardana (2007 also mentioned that shortage of sufficient trained ICT professionals is main hurdle of developing ICT related works in Sri Lanka. According to Gunawardana, their seems to be three main drives for this shortage, Sri Lanka produces only a small number of ICT trained University graduates, Sri Lanka loses many ICT graduates soon after graduating as they migrate for foreign jobs, creating a shortage of experienced ICT professionals [34]. Therefore, lack of trained IT staff is an impediment for developing digital libraries in Sri Lanka.

Another major issue of developing digital library services in Sri Lankan Universities is caused by the lack of interest of developing digital libraries among people who are at top management. Because of financial and skilled man power difficulties, managers are also sometime fed up to continue these tasks. Similarly, some staff members are reluctant to work with new technological applications. They have a fear of working with IT related activities. This is also kind of barrier while initiating and continuing IT related work in libraries.

Prevailing limited infrastructure facilities may cause for dragging to development in digital libraries and Libraries are facing another challenge of software, hardware purchasing for library work. Because of bureaucratic complexity, acquisition of equipment and materials is slow due to the procedures involved. It takes a long time to acquire items due to the lengthy administrative procedures[35] [36].

Gamage (2013) pointed out librarians' views regarding the issues and challenges of digital library initiation in Sri Lanka. University librarians are highly confident to establish digital libraries in Sri Lankan University libraries. According to the librarians opinions digital library establishment in University libraries system is essential and government should initiate steps to develop policies regarding on this issue. Unless government provides funding and improves the University infrastructure facilities building an effective digital library system is not possible. Further librarians are stressed on intellectual property issues and they decisively believe that digital libraries should be established according to the user requirements not as adaptation of developed counties[37].

Conclusion

In conclusion, this paper tries to synthesize from a general viewpoint the results obtained from the available literature. This literature review has sought to explore the introduction of IT and ICT facilities into Sri Lankan University library sector from the beginning and current position of digital library systems and its services. Digital library system development in University libraries in Sri Lanka is under process and is progressing. Because of problems and difficulties some University libraries are far behind from leading universities. To overcome the issues and challenges, the government should endorse providing financial aid and other facilities. As well as the researchers who are engaging in Digital libraries contend that the formation of National Digital library Task force is necessary with the support of government. Universities also should have executed plans with a proper vision to achieve realistic goals in future.

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