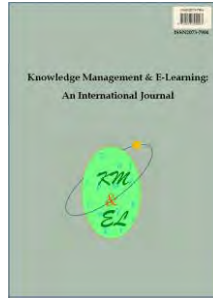# Building a model for digital content management in agricultural university libraries in Bangladesh

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Building a model for digital content management in agricultural university libraries in Bangladesh

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Abstract: The purpose of this study is to build a model for Digital Content Management (DCM) in agricultural university libraries in Bangladesh. The model focuses on identifying the necessary tools and techniques required for DCM and finding out the problems and prospects of DCM for enhancing resource sharing among the agricultural universities in Bangladesh. To investigate these issues, surveys were used to collect data from 245 participants, who were students and teachers from seven public agricultural universities in Bangladesh. The findings reveal some hindrances to the establishment of DCM, such as lack of constant power supply, limited bandwidth speed, some users have lacking fundamental IT knowledge and shortage of digital resources, in addition to some suggestions for improving DCM in these libraries. Based on the survey results and related literature, the DCM model for agricultural university libraries of Bangladesh has been proposed and discussed.

Keywords: Digital content management; Agricultural university libraries; Resource sharing; Bangladesh

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1. Introduction

The development and growth of Information and Communication Technology (ICT) are rising rapidly (Hariyanto et al., 2020) and it has brought radical changes in every field of human activity. The exception has not been made in the field of library profession and services. It is obvious that the rapid increase in the information technology and communication developments will be considered as a challenge to the academic library decision-makers; they have to get benefit from these rapid technologies, or their libraries will die and will lose their reliability (Ruan & Zhu, 2013; Samea, 2015). So, now computers, software, the internet, etc. are being used as a part and parcel of library and information services. All activities of a library such as cataloguing, classification, circulation, purchases, administration, etc. are now automated. "Over the last two decades, the libraries have witnessed the impact of information technology that has been affecting the structure of the services to a great extent" (Kaul, 2001). The world is now familiar with the digital library that is paperless, boundary-less and all-time accessible from anywhere of the world, that has been materialized by using ICT. Library automation and digital library provide unprecedented facilities to both library patrons and library staff. But there are some problems to operate these types of libraries. As library professionals have been habituated to operate traditional libraries. Nowadays, they have to work in an automated and digital environment. Therefore, library professionals are facing many difficulties to manage the digital library. Digital Content Management (DCM) is one of the problems of a digital library. DCM is not a new issue in developed countries as it was started from the invention of the internet in the developed countries. But library professionals in the developing countries have been planning and trying to build a digital library.

Presently, there are 45 public universities and 103 private universities in Bangladesh and three international universities (UGCB, 2019). Among 45 public universities, there are 7 agricultural universities in Bangladesh. The universities are 1. Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), 2. Bangladesh Agricultural University (BAU), 3. Chittagong Veterinary and Animal Sciences University (CVASU), 4. Hajee Mohammad Danesh Science & Technology University (HSTU) 5. Patuakhali Science and Technology University (PSTU) 6. Sher-e-Bangla Agricultural University (SAU) 7. Sylhet Agricultural University (SAU).

The purpose of this study is to build a model for Digital Content Management (DCM) of the agricultural university libraries in Bangladesh gaining experiences from the developed countries. Identifying the necessary tools and techniques essential for DCM and finding out the problems and prospects of DCM for the enhancement of resource sharing among the agricultural universities in Bangladesh. It has been tried to explore the ways to overcome the existing problems and indicating the future prospects of DCM for administrators, policymakers, decision-makers, and faculties and students of agricultural university libraries in Bangladesh.

The rest of the paper is structured as follows. Section 2 describes the conceptual map by reviewing related literature. Section 3 explains the aims and objectives of this study. Section 4 presents the research methodology. Section 5 discusses the findings and discussion. Section 6 presents the model of DCM for Agricultural University Libraries of Bangladesh and section 7 concludes the paper.

2. Literature review

This section reviews the relevant literature on DCM published in the national and international journals, conference proceedings and other primary and secondary sources.

2.1. Digital content management (DCM)

The term DCM has often been used interchangeably with other related terms such as Digital Rights Management (DRM), Electronic Document Management Systems (EDMS), Electronic Resource Management (ERM). Murdock (2010) stated the first A to Z list for electronic resource management was introduced by Serials Solutions in the year 2000, ERM has been growing and evolving in the attempt to keep up with the exponential growth of electronic resources and the greater demand to furnish a system to organize and track libraries' subscriptions and access to such titles. Content Management (CM) is the set of processes and technologies that support the collection, managing, and publishing of information in any form or medium (Murugan, 2015). DCM system is a software system that provides preservation, organization and dissemination services for digital collections (Han, 2004). Digital content represents the implementation within the computer memory of information regarding a certain aspect of the surrounding world (Ivan et al., 2009). Having emerged in the 1990s, the concept of digital libraries has become very popular among the disciplines of computer science, cognitive science, and library and information science (LIS) (Islam & Ikeda, 2014). The development of a digital library requires adequate digital skills to use the appropriate digital library software, apply OCR, assign metadata, acquire the knowledge to use a scanner for digitization and develop good, quality digital content with high resolution (Khan & Bhatti, 2017).

2.2. DCM in university libraries

With the rise of online communities, communication has shifted from face-to-face models of interaction to a more digital approach for maintaining and establishing relationships (Siddike et al., 2015; Moorman & Bowker, 2011). The development of internet technology and its global diffusion boosted the success of digital content (Mangani & Tarrini, 2017). Libraries are acquiring born-digital materials and also creating in-house digital resources (Zaveri, 2015). The process of capturing and converting from analogy to digital format is often called as 'digitization' or 'digitalization' (Singh, 2003). Khan and Bhatti (2017) outlined that the selection of digital infrastructure, quality of digital content, computer hardware and software, accessing digital content, server technology, copyright issues and developing a database of digital content were important considerations when developing a digital library. libraries are converting print collections into digital ones and publishing them online to facilitate remote access to users and digitization is a new phenomenon in Pakistani libraries, and becoming increasingly popular and important (Murdock, 2010).

2.3. Opportunities and challenges of DCM

The goal of the Digital Content Management System (DCMS) is to permit organizations to achieve strategic goals (Sivakumar et al., 2012). Inadequate IT infrastructure in libraries, lack of skilled professionals and budget constraints might be among the major causes (Khan & Bhatti, 2017). Gbaje and Mohammad (2013) described the challenges of implementation of DC in the libraries such as lack of awareness of the challenges surrounding digital preservation, funds, skilled manpower, equipment, staff and skilled

staff in the digital preservation unit. The biggest problem of the global digital environment today is the abundance of information and their organization (Vrana, 2011). Swaths of digital content are often lost due to the most insignificant error or corrupted device, often without the knowledge of the user(s) (Cassidy & McEniry, 2014). As digital collections grow exponentially, institutions are faced with the challenge of providing continued access as well as long term preservation (Wiseman & Matthews, 2016). The most academic libraries face difficulties in resolving the problems that arise due to the properties of the digital content, such as, for instance, the access to university digital collections by students on campus and by distance learners (Koulouris & Kapidakis, 2005). Digitization process is extremely complex, difficult in manner, time-consuming and needed highly qualified and experienced professionals to do the job efficiently (Islam, 2013).

2.4. DCM in the libraries of Bangladesh

The rapidly growing use of information and communication technology (ICT) in academia is changing the way in which knowledge is created, organized, stored, managed, and disseminated (Islam, Kunifuji, Miura, & Hayama, 2011). As a result, digital environment has been created everywhere. But full-fledged digital library systems have not yet been developed in Bangladesh (Shuva, 2013). He also observed some public and private university libraries have recently realized the importance of building digital libraries and initiated projects to develop digital library systems. Reza (2006) mentioned the main obstacles of creating digital library in Bangladesh is lack of technical knowledge and support; lack of sufficient funding; Islam (2013) found some problems such as lack of concept about digitization, lack of expert personnel, lack of coordination; fear of technology and new concept among the organization's employee, backward and unhelpful attitudes, etc. Digitization and automated library systems in Bangladesh are still in the infancy level (Alam, 2012). In addition, Islam (2013) reported that digital library initiatives in Bangladesh are still in the birthplace. He argued that some initiatives have been made but they are not any complete attempt in terms of building a real digital library in Bangladesh.

3. Objectives of the study

The study aims to build a model for DCM of the agricultural university libraries in Bangladesh. The more specific objectives of the study are to:

   i.   Identify the necessary tools and techniques required for DCM;
  ii.   Find out the problems and prospects of DCM for the enhancement of knowledge sharing among the agricultural universities in Bangladesh;
 iii.   Explore the ways to overcome the existing problems;
  iv.   Identify the prospects of DCM for administrators, policymakers, decision-makers, and faculties and students of agricultural university libraries in Bangladesh.

4. Methods

Quantitative and qualitative approaches were employed in this study. Survey methods were used for gathering data using a questionnaire. The questionnaire was used for user

surveys to reveal their requirements regarding DCM. The questionnaire consisted of open-ended and close-ended questions. Seven public agricultural universities in Bangladesh participated in the study: Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Bangladesh Agricultural University (BAU), Chittagong Veterinary and Animal, Sciences University (CVASU), Hajee Mohammad Danesh Science & Technology University (HSTU), Patuakhali Science and Technology University (PSTU), Sher-e-Bangla Agricultural University (SAU), and Sylhet Agricultural University (SAU).

A stratified random sampling technique was used for the selection of the sample. We randomly selected 10 teachers and 25 students of different faculty of every university. A total of 70 teachers and 175 students filled the questionnaire. Among the open-ended questions, some questions were very much related to building a model of DCM for agricultural university libraries of Bangladesh. Based on the insight and views of the respondents as well as the review of related literature, the DCM model has been built in this study. The responses of qualitative and quantitative questions were written in plain paper. The data collected from open-ended questions were analyzed thematically and the data obtained from close-ended questions were analyzed by using the descriptive analysis technique of SPSS.

5. Findings and discussion

As mentioned previously, data were collected from seven agricultural university libraries of Bangladesh. Two hundred and forty-five (245) respondents participated in the survey. Among 245 respondents, 174 respondents were male (71 percent) and 71 (29 percent) were female.

5.1. The use and application of digital content

The respondents were asked to express their level of agreement on different usages of digital content (DC). The level of agreement with factor was analyzed on seven-point Likert scales in Tables 1 to 8. The mean and standard deviation of the responses were calculated according to the following scores: 1.00 = strongly disagree, 2.00 = Disagree, 3.00 = somewhat disagree, 4.00 = neither disagree nor agree, 5.00 = somewhat agree, 6.00 = agree, 7.00 = strongly agree.

Table 1
Level of agreements about more essential digital contents for the 21st century

Statement	N	Min.	Max.	Mean	SD
Digital contents are more essential for undergraduate study	240	1	7	6.79	.645
Digital contents are more essential for post-graduate study	240	1	7	6.89	.620
Digital contents are more essential for researchers	240	1	7	6.94	.493
Digital contents are more essential for faculty members	240	1	7	6.07	1.285
Digital contents are more essential for the general reader (who read for pleasure)	240	1	7	5.23	1.626

Librarians of developing countries need to shift their attention from traditional library activities of collecting, processing, storing and accessing information, and to offer

or deliver customer-centered automated information services; generated by using online/offline databases, e-resources, e-journals, networks, consortia, etc (Mole & Obidike, 2015). Today's users have no patience and cannot wait for information because they expect information on a single click on his laptop, iPod, or even on mobile (Chandel & Islam, 2011). Therefore, the requirements of these users cannot be fulfilled without digital content.

Digital contents (DCs) are more essential for undergraduate study: DCs are essential for undergraduate studies especially textbooks. The respondents agreed with this statement (with a mean score of 6.79) that DCs are required for undergraduate students for studying their course work properly.

Digital contents are more essential for post-graduate studies: DCs are more important for post-graduate studies particularly e-journals, e-dissertations, e-theses, etc. The respondents agreed with this statement (with a mean score of 6.89) that DCs are more essential for post-graduate students for studying their course and research work properly.

Digital contents are more essential for researchers: The researchers need the latest information on their research fields. The latest information is available in journals, dissertations, theses, etc. If those journals, dissertations, thesis are accessible electronically, researchers get information very quickly. The respondents agreed with the statement (with a mean score of 6.94) that DCs are more significant for researchers to do research activities promptly.

Digital contents are more essential for faculty members: The faculty members always keep themselves up-to-date about their fields. It is possible by reading e-journal, e-theses, e-dissertations. So, respondents agreed with the statement (with a mean score of 6.07) that DCs are more required for faculty members.

Digital contents are more essential for the general reader (who read for pleasure): General readers generally read for mental satisfaction. They need not latest information usually. Now all types of information are available in the DC format. The respondents agreed with the statement (with a mean score of 5.23) that DCs are needed for general readers.

5.2. More frequently used DCs

Nowadays, e-newspapers are more popular in all types of readers. Because increasing popularity of mobile reading devices such as mobile phones, netbooks, and e-readers, many publishers are seeing the value in producing an e-paper alongside their print editions to boost subscription and readerships (Panda & Swain, 2011). Likewise, the habit of reading e-books, e-journals, e-report, etc. is gradually increasing in the globe. For instance, the rise of e-books in American culture is part of a larger story about a shift from printed to digital material (Rainie et al., 2012).

The agreement level of the respondents regarding the existing digital contents of their library that can fulfill their learning requirements as shown in Table 2.

Table 2 shows that the highest mean score is 5.23 on a seven-point Likert scales for "e-reports" as reading materials, and the lowest mean score is 4.83 for "e-proceedings". The second highest mean score is 5.16 for "e-newspapers" followed by 5.02 for "e-magazine" 4.95 for "e-books and "e-these". The mean score of e-journals is 4.94 followed by 4.90 for "e-dissertations". However, it is obvious from the data that amongst the different categories of reading materials, the highest respondents were

observed on the e- reports and e-newspaper. The highest tendency towards reading these materials might be due to the number of populations, individual need, and preference of the general mass. Besides, the maximum number of people read the newspaper daily for many causes such as spending leisure time by reading the newspaper, collection of day-to-day important information and communication.

Table 2
Satisfaction with the existing digital contents

Statement	N	Min.	Max.	Mean	SD
E-books	240	1	7	4.95	2.034
E-journals	240	1	7	4.94	2.017
E-proceedings	240	1	7	4.83	1.912
E-theses	240	1	7	4.95	1.929
E-dissertations	240	1	7	4.90	1.952
E-magazine	240	1	7	5.02	1.970
E-newspapers	240	1	7	5.16	1.966
E-report	240	1	7	5.23	1.983

5.3. Major problems of using DCs

Digital content has become an increasingly important and pervasive factor shaping economic and social development (Ocde, 2008). In developing countries, the digital environment is not smooth for using all kinds of digital content properly. The users are facing enormous difficulties to use DCs, insufficient bandwidth is one of the mentionable problems. Table 3 indicates those problems that library users are generally facing every day.

Table 3
Problems of using DCs

Statement	N	Min.	Max.	Mean	SD
Essential resources are not available	240	1	7	5.56	1.646
Downloading speed is slow	240	1	7	5.64	1.602
Sometimes the server is out of service	240	1	7	5.63	1.614
Users have to lack fundamental computer knowledge	240	1	7	5.03	1.785
Users have to lack navigating technique	240	1	7	4.95	1.753
Library staff do not cooperate to use digital content	240	1	7	4.52	2.050
Eye power is declining for more use of digital devices	240	1	7	4.78	1.833
Users are reluctant as they are not habituated to use digital content	240	1	7	4.99	1.850

Table 3 shows that the highest mean score is 5.64, 5.63 and 5.56 for the statements "Downloading speed is slow", "Sometimes server is out of service", "unavailability of Essential resources are not available" respectively, while the lowest mean score is 4.52 for the statement of "Library staff do not cooperate to use digital content". The mean score of 5.03 for the statement "Users have to lack fundamental

computer knowledge", 4.99 for "Users are reluctant as they are not habituated to use digital content", 4.95 for "Users have lacking navigating technique", 4.78 for "Eye power is declining for more use of digital devices". The data revealed that the salient problems faced by the reader in using digital contents of the library are a slow downloading, error of server and unavailability of essential resources, out of many other problems faced by the readers while using library services. The problems might be occurred or accelerated by various or number of causes, for example, net facility, unavailability of broadband services, skilled manpower, technical problems, and the scarcity of vital elements provided by the library authority due to financial crises.

5.4. Suggestions to overcome the problems

Our users are facing many difficulties to navigate digital content. Some common problems are identified that are mentioned in the table and agreement level of respondents of those problems has been stated in that table. However, the way of overcoming the obstacles that are presented in Table 4. This table depicts the level of agreement of the respondents for the improvement of existing digital services.

Table 4
Agreement levels of the respondents regarding the recommend some suitable measures that would improve existing digital content services

Statement	N	Min.	Max.	Mean	SD
Creating easy access facilities	240	1	7	6.20	1.348
User-friendly interface	240	1	7	6.23	1.172
Improved bandwidth speed	240	1	7	6.45	1.054
An increasing number of digital textbooks	240	1	7	6.35	1.239
Uninterrupted electricity supply	240	1	7	6.23	1.357
Collection strengths	240	1	7	6.25	1.213

Creating easy access facilities: There are some library databases in which important DCs are available, but a navigating system of those databases is not very familiar to the users. Users are not satisfied to use those databases. So, accessing the DCs should be simplified. The respondents agreed with the statement (with the mean score of 6.20) that easy access facilities to the DCs should be ensured.

User-friendly interface: Maximum users are not technologically sound. They cannot access the databases if its interface is not simple and familiar to the users. So, the database interface should be users friendly. The respondents agreed with the statement (with the mean score of 6.23) that databases of DCs should be users friendly interfaced.

Improved bandwidth speed: High-speed internet connectivity is a prerequisite for DC management. The existing bandwidth speed of all agricultural university libraries is not a satisfactory level. So, respondents agreed with the statement (with the mean score of 6.45) that the existing bandwidth speed should be improved.

An increasing number of digital textbooks: Textbooks are the main resources of a library it may be printed or digital whatever format is it. The present digital textbook collections of university libraries in Bangladesh are not good enough. In this context, the respondents agreed with the statement (with the mean score of 6.35) that several digital textbooks should be increased.

Uninterrupted electricity supply: The constant power supply is very much essential for starting DC management. Providing continuous electricity in third world countries especially in Bangladesh is very difficult. But it is necessary for DCM. The respondents agreed with the statement (with the mean score of 6.23) that endless electricity supply is the first and foremost requirement for DCM.

Collection strengths: The existing digital collections of our university libraries are not enough. The collection should be increased. The respondents agreed with the statement (with the mean score of 6.25) that collections should be strengthening.

5.5. Purposes of using DCs

The respondents indicated what the purposes they are using DCs and their level of agreement regarding this question are mentioned in Table 5.

Table 5
Purposes of using DCs

Statement	N	Min.	Max.	Mean	SD
Preparing notes for the undergraduate course	240	1	7	5.87	1.471
Preparing notes for the post-graduate course	240	1	7	5.90	1.476
Report writing	240	1	7	5.98	1.429
Thesis writing	240	1	7	6.08	1.464
Dissertation writing	240	1	7	5.93	1.507
Paper writing	240	1	7	5.85	1.472
Easy writing	240	1	7	5.93	1.324

Table 5 shows that the highest mean score is 6.08 for the statement of "Thesis writing", while the lowest mean score is 5.85 for the statement of "Paper writing". The second highest mean score is 5.98 for the statement of "Report writing" followed by the mean score of 5.93 for the statement of "Dissertation writing" and "Easy writing", 5.90 for "Preparing notes for post-graduate course" 5.87 for "Preparing notes for the undergraduate course". The data indicates that most of the respondents use DCs for dissertation, thesis and report writing. Since accessibility and usability of DCs are more convenient than printed reading materials.

5.6. Advantages of DCM system

The digital revolution of the past few decades has made a radical impact on library practices in collecting, organizing, storing, retrieving, and disseminating information globally (Roknuzzaman et al., 2009; Islam, Kunifuji, Hayama, & Miura, 2011). The digital library system brings greater access to users. A diverse range of patrons can access more information and often simultaneously (Shuva, 2013). Table 6 represents the level of agreement of the respondents regarding the advantages of the DCM system.

Table 6 shows that the highest mean score is 6.06 for "Enhanced information retrieval", and the lowest mean score is 5.76 for the statement of "No physical boundary". The second highest mean score is 6.00 for the statement of "Universal accessibility", followed by the score of 5.92 for the statement of "Unlimited storage", 5.89 for "Multiple access" 5.86 for "Round the clock availability", 5.84 for "Added Value". 5.80 for

"Preservation for some print material". According to data from the respondents, the most advantages of DCs are the preservation facility of printed materials, quick retrieval of information and worldwide accessibility.

Table 6
Advantages of the DCM system

Statement	N	Min.	Max.	Mean	SD
Enhanced information retrieval	240	1	7	6.06	1.303
Unlimited storage	240	1	7	5.92	1.435
Round the clock availability	240	1	7	5.86	1.398
No physical boundary	240	1	7	5.76	1.495
Multiple access	240	1	7	5.89	1.387
Preservation for some print material	240	1	7	5.80	1.357
Added value	240	1	7	5.84	1.301
Universal accessibility	240	1	7	6.00	1.398

5.7. Drawbacks of DCM system

Shuva (2013) identified one of the most common problems with digital library development in Bangladesh in his study that low speed of internet connection and frequent fluctuations in electricity. However, the respondents of the study expressed their level of agreement about the disadvantages of the DCM system in Table 7.

Table 7
Drawbacks of the DCM system

Statement	N	Min.	Max.	Mean	SD
Lack of constant power supply	240	1	7	5.35	1.862
Consistent Internet facilities	240	1	7	5.61	1.638
Cannot be marked like a hard copy	240	1	7	5.41	1.603
The file may be corrupted	240	1	7	5.15	1.792
The database sometimes loses information naturally	240	1	7	5.16	1.667
Virus attacked	240	1	7	5.20	1.738
Hacked information	240	1	7	4.95	1.922
Depended on machine	240	1	7	5.48	1.618

Table 7 shows that the highest mean score is 5.61 for the statement of "Consistent Internet facilities", while the lowest mean score is 4.95 for the statement of "Hacked information". The second highest mean score is 5.48 for the statement of "Depended on machine" followed by the score of 5.41 for the statement of "Cannot be marked like hard copy", 5.35 for "Lack of constant power supply", 5.20 for "Virus attacked" 5.16 for "Database sometimes loses information naturally", 5.15 for "File may be corrupted". From these data, constant and high-speed internet connectivity is necessary for getting more benefits from DCM. DCM system is fully mechanized and depending on the machine. Mechanized activities are dependent on technical people and a constant power

supply. Soft copy of reading materials cannot be used as conveniently as hard copy such as writing an annotation, using bookmarks, portability, etc. Continuous electricity is required for the establishment of the DCM system. Without nonstop electricity supply DCM cannot be run. Bangladesh as a developing country it cannot fulfill the above-mentioned facilities. So, these are the mentionable drawbacks of the DCM system in Bangladesh.

5.8. DCM for resources sharing activities

Digital libraries are very important in resource sharing initiatives, easier to send and easier to receive the electronic documents, whether in text, HTML, PDF, or any other readable format, to participating libraries (Reitz, 2002; Sharif, 2006). Despite these facilities, some difficulties are arisen to sharing resources such as Copyright law, intellectual property laws, and license terms can also limit the sharing of information (Bailey-Hainer et al., 2014). However, poor countries differ from rich ones not only because they have less capital but also because they have less knowledge (Kaul, 2001). Therefore, knowledge is very powerful if it is used properly by sharing among the right users. It was asked the interviewees how DCM enhances knowledge or resources sharing activities in the library. The agreement level of the respondents of this question is described in Table 8.

Table 8
Agreement level of the respondents regarding the enhancement of KS through DCM

Statement	N	Min.	Max.	Mean	SD
Anyone can access a password-free DCM system	240	1	7	5.28	1.900
Digital content can be shared with each other easily	240	1	7	5.75	1.490
DCM is well organized, so, it is shared promptly	240	1	7	5.62	1.415
Digital content is shared through World Wide Wave	240	1	7	5.82	1.477
Sharing cost is very few	240	1	7	5.81	1.467
Less time involvement	240	1	7	5.69	1.597

Table 8 shows that the highest mean score is 5.82 for the statement of "Digital content is shared through World Wide Wave", while the lowest mean score is 5.28 for the statement of "Anyone can access in a password-free DCM system". The second highest mean score is 5.81 for the statement of "Sharing cost is very few" followed by the mean score of 5.75 for the statement of "Digital content can be shared each other easily", 5.69 for "Less time involvement", 5.62 for "DCM is well organized, so, it is shared promptly". The data indicates that knowledge or resource sharing activities would be accelerated sharing DCs through World Wide Wave. As it can be shared easily and with a minimum charge so, it is enhanced knowledge or resource sharing among the readers in the library.

5.9. Open opinion Views on DCM and DCM model

The ICT, Internet of Things (IoT) and cloud system technology are being used in almost every area of life in this digital environment (Rahman, 2019; Ahmad et al., 2019; Liu et al., 2018). The Government of Bangladesh has also a plan to introduce and implement those technologies which make human life easier. As a result, the Government of Bangladesh has taken initiatives to build a digital Bangladesh. The Government declared

vision 2021 makes use of the Digital Bangladesh strategy to highlight the tremendous capacity of information and communication technology to help steer the country's development during the Perspective Plan (Bangladesh Planning Commission, 2010). One of the respondents stated that maximum university libraries and research institute libraries of Bangladesh are maintaining automated and institutional repositories. Another respondent firmly mentioned that all primary and secondary education board's books are digitized now in Bangladesh, so it can be said that Bangladesh is rapidly going to reach digital Bangladesh. The electronic tendering system is a common practicing matter in both government and nongovernment organizations of Bangladesh. It is also an indicator that Bangladesh is going to create extensively digital content. One respondent revealed that since digital content is more convenient to handle and less expensive, it has been getting popularity among information professionals as well as information seekers. Some respondents mentioned that university libraries of Bangladesh are trying to meet the needs of patrons introducing institutional repositories and digital libraries. But they do not follow standard DCM systems; as result patrons do not get maximum benefits from the digital library. They also suggested that all university libraries or a group of same nature university libraries (Agricultural university libraries, Engineering university libraries, Medical University libraries, general university libraries, etc.) should follow a unique standard DCM system for ensuring better information services to the patrons. Based on the opinions and insights of the respondents, we proposed a model of DCM for Agricultural University Libraries of Bangladesh for confirming effective and efficient information services to the patrons of agricultural university libraries of Bangladesh.

6. Proposed model for DCM in agricultural university libraries of Bangladesh

There are seven agricultural universities in Bangladesh. All these universities are a public and autonomous body. They are directed by following their own rules and regulations. Therefore, their libraries are also driven by their self-independent rules and regulations. Their library collections, service system, use of technology, manpower, space, library hours, library policy, etc. have developed to support their parent university's library users. Though they are independent, they can do some works jointly and discussing each other for ensuring the effective and efficient service of their library patrons. Since libraries are essentially user-oriented organizations (Islam et al., 2015). If they do the same nature of job jointly, it saves the cost, time and manpower. However, many works they can do jointly such as cataloging, classification, IT support, library automation, building a digital library, negotiating with publishers. Among those works building a digital library (DL) is a very important issue that should be developed collaboratively and regulated by a focal point. After creating a DL, for getting better services from that DL, the DCM system should be set. However, based on the sagacious perception of the respondents and review of related literature, the DCM model for agricultural university libraries of Bangladesh has been built (Fig.1). Then, the model has been explained below to demonstrated how they will share their digital resources and services among the participated libraries.

Stated earlier, there are seven public agricultural universities in Bangladesh. The mission, vision, and objectives of these universities are almost the same. Therefore, the demand and requirements of library users of those universities are almost similar. However, every university library has been serving its users by their own library collections. But no library in the world is self-sufficient to fulfill the demands of their users without the help of other libraries (Rahman et al., 2006). The agricultural university libraries of Bangladesh are not an exception in this regard. They need help with each

other to provide effective and efficient library services for their users. At present, it is possible to cooperate among the libraries as technology has opened boundaries in terms of data and the resource sharing world has become smaller, librarians have become increasingly adept at locating materials held around the world (Goldner & Birch, 2012). If the proposed model is followed in providing services, the library users of agricultural universities in Bangladesh would be more benefited.
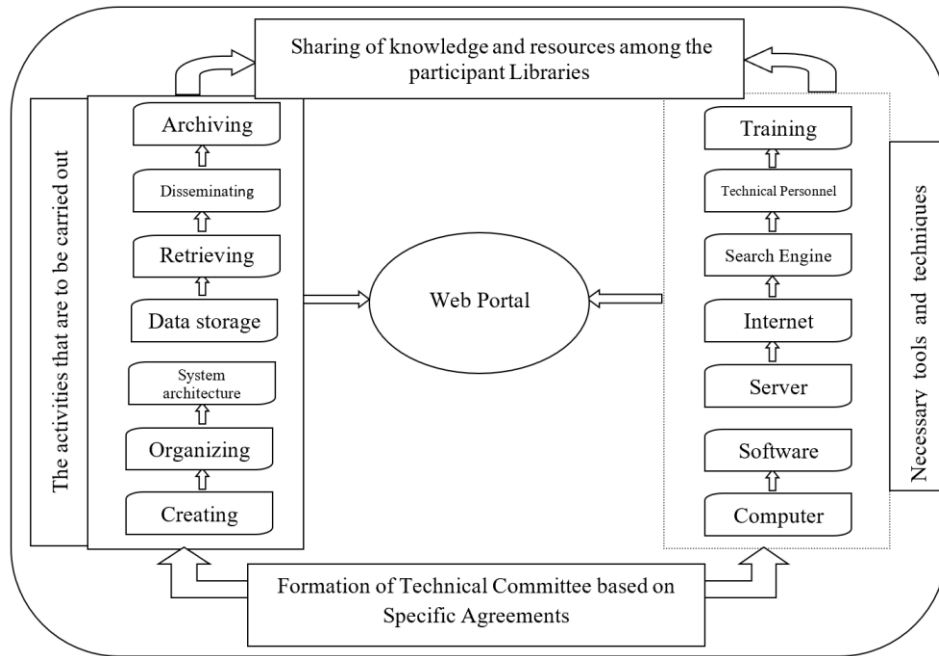

Fig. 1. DCM Model for agricultural university libraries of Bangladesh

As every university library has its own set up for serving its users, the proposed service may be provided with that setup. Some respondents cited that a focal point is necessary for operating a joint digital library for establishing a standard DCM system for better digital library services. It should be selected under an agreement. The user will get access to the database of each library with which they will be able to search the collections of each other through the focal point. A respondent who is a teacher of computer science stated that a customized search engine is required which would be installed with a new server for data harvesting from any networked university servers. Only authorized users (all students and employees of networked universities) will be able to get access to this network. To protect the access of unauthorized users IP based or user-password authentication should be imposed. If IP based authentication is set up, the information will be available in that particular area. It is a relatively easy system. User-password authentication can also be imposed. In this context, every user will be given a username and password with which they will be able to login to the search engine page. It is somewhat complex than the previous one. But it can be used everywhere in the world. However, to get information smoothly from this network, a common API (Application programming interface) should be used. One of the respondents revealed that an agreement should be needed for implementing these network services. In this agreement, some issues would be mentioned such as the copyright of the authors may not be ignored, and types of resources would be under this service. Theses, dissertations, articles,

research outcomes, raw data, reports, databases, e-books, e-journals, may come under the service.

6.1. DAULB technical committee

The respondents of this study opined that the formulation of a technical committee is necessary for operating the consortia smoothly. Therefore, a DAULB (DCM Agricultural University Library of Bangladesh) Technical Committee will be formed up. All librarians and/or librarians (in-charge) will be members of the committee. The chairman of the committee will be selected according to the alphabetical order of the university's name. The duration of chairmanship maybe two years or more or less according to the opinion of the committee members. According to the opinion of the respondents the committee will perform the following activities:

i.   Selection of e-resources;
ii.   Arrangement of training for library personnel and library patrons;
iii.   Monitoring of quality of services;
iv.   Submitting an annual report to the Vice-Chancellor or competent authority of respective university;
v.   Arrange a meeting every three months.

6.2. Web portal

A library portal is a single-user interface for navigating information from a wide variety of e-resources, both inside and outside the library. According to Ofoegbu et al. (2014) the web portal as the type of knowledge management system provides a rich space to share and search information as well as communication services like content provision for the users. Generally, a web portal allows users to access information from varied sources in an integrated way (Mansourvar & Yasin, 2010). Awre (2003) described that a web portal is a network service that collects information from different resources into a personalized and single point of access using searching techniques such as cross-searching, harvesting and alerting to help users. Some respondents mentioned that a web portal will be developed for providing access to all relevant e-resources at one point. Users will search their required information through this web portal. Every user will be provided a user name and password to access the portal for navigating the information.

6.3. Agreement

Some respondents suggested that the seven university libraries have to come under an agreement for materializing this consortium. According to the opinion of respondents the following terms of references should be included in the agreement.

i.   All agricultural university libraries of Bangladesh will work together for providing better services for library patrons.
ii.   All digital collections of networked libraries can access to read, download, print of all patrons.
iii.   E-resources (e-books, e-journals, etc.) have to purchase after discussing with each other for avoiding duplication and negotiating and bargaining with publishers and e-resources provider or vendors jointly for cost-saving.

iv.   Fundraising for development of web portal, server and maintenance and management cost of it.

v.   A university library among the networked university libraries will operate and manage the web portal which has technical and infrastructural facilities are available.

vi.   Selection of focal point among the networked university libraries which operate the DAULB web portal and other related works and fixed its maintenance and other related costs.

6.4. Creating

One of the respondents stated that Digital Content (DC) creation is the first step of DCM. DCs are the main asset of any digital library. Some contents are created by a "born-digital" format and some "digital surrogates" i.e. created in non-digital form but subsequently converted to digital form (Anyaoku et al., 2019). Those contents are printed as print-format that contents have to scan to PDF or HTML format for uploading the digital library. Therefore, content creation is the first and foremost task of DCM.

6.5. Organizing

Creation and selection of meta-data data are crucial for searching and retrieving of digital contents. Some respondents mentioned that proper organizing of contents, contents would not be retrieved when it will be searched. So, contents should be organized according to the rules of knowledge organization of the library and information science.

6.6. System architecture

One of the respondents opined that the architectural design of preservation software is very important. Who uploads contents? Who can access, how to perform the responsibilities of different responsible people who are involved in the system? All activities would be properly designed at system architecture.

6.7. Data storage

According to the opinion of some respondents that data should be input in the database in the proper way. If data do not input a systematic way, data could not be retrieved. So, inputting data to maintain the proper way in the database is a significant job.

6.8. Disseminating

Some respondents revealed that content dissemination is a very important task in these networked libraries. All users of the seven university libraries enter into the database through the web portal and they search their required contents in the search options. They can read, download and print their necessary contents.

6.9. Retrieving

In this study, some respondents revealed that retrieving facilities should be available in every database. If these facilities do not exist in the database those databases is not usable.

All types of search options would be present in the database. Contents would be found by search and it would be reused when necessary.

6.10.   Archiving

All contents would be preserved for future use. Hence, preservation is very much significant work for establishing a digital library. Popular preservation software should select for contents preservation. DSpace is worldwide a well-liked digital library software. It is open-source and free of cost software. Maximum respondents mentioned that DSpace may be used as digital preservation software in this network.

6.11.   Computer

The computer has become an undivided part of our life. It is a necessary device that is used to our daily routine work to tuft scientific work. So, usages of computers in the library, activities of the library have become prompt, efficient, accurate and smart. Some services are created in every country of the world after the invention of the computer that would not possible to provide without the computer. Digital library service is one of the mention services which cannot ensure beyond the computer. According to Rahman (2020), digital records are created, communicated and maintained by means of computer technology and they may be "born digital", created using computer technology, or they may have been converted into digital form from their original format, e.g. scans of paper documents. The respondents of this study mentioned that the computer is must for establishing the DCM system.

6.12.   Software

The software of the computer is treated as the soul of a computer. Without software, a computer is like a dead body. Quality software is essential for the preservation of content for a long time. There are several types of software for preserving digital content such as preparatory software, open-source free software, open-source commercial software, in house-built software. There is much open-source free software in the world. Some open-source free software which is very popular for their features, facilities, easily usable, easy customization, user-friendly, etc. DSpace, e-print, fedora, are one of them. Some respondents reported that, since Bangladesh is a developing country, it can select any popular open-source free software for establishing a digital library.

6.13.   Server

Some respondents expressed that a server will be needed for hosting the web portal. All networked seven university library servers will be connected with the web portal server. Since all servers are connected with web portal servers; users search their desired information in the search box of the web portal, and they get information very short time. Consequently, users getting access to all information of seven universities in a single point and save their valuable time.

6.14.   Internet connectivity

The Internet is playing a vital role in human communication. The entire world is considered as a village because of Internet connectivity. In the field of library networking,

the internet is also performing as a key role to disseminate knowledge among networked library users. It seems to us that all networked libraries are situated very closely by internet connectivity though physically they are not close. It may far a thousand kilometers away from one another. Most of the respondents stated that the internet is very much essential to establish DCM for the Agricultural University Libraries of Bangladesh.

6.15. Search engine

Search Engine is a program that searches the database, gathers and reports the information which contains the specified or related terms (Tarakeswar & Kavitha, 2011). According to most of the respondents, a powerful search engine is needed for searching the information from the database. In the DAULB web portal, a customized search engine would be used for information searching. When a user searches specific information in the search box of the web portal the search engine will search for information in the networked databases only and collect that information from the database where it is available since it is a customized search engine. As this search engine searches the information only seven university library databases, it will be able to search quickly, efficiently and accurately. As a result, it can filter information from the databases and present the information according to the query of the users.

6.16. Technical personnel

A mentionable number of respondents stated that technical personnel is a need for establishing a digital library and initiating DCM. Technical persons can play a vital role for implementing any automation project (Rahman & Islam, 2019). They would attend to the problems that may coup up with the system. DCM could not run properly without the help of technical people.

6.17. Training

Many respondents proclaimed that training is very important for any new system. Without training library staff would not operate the DCM system properly as well as library users could not navigate information if they do not get the necessary training. So, library staff and users both need adequate training for getting more benefits.

7. Limitation

The proposed model of this study is not yet formally tested. It needs more research for testing it in the agricultural university libraries of Bangladesh. Then the model would be more effective and functional.

8. Conclusion

The aim of the study was to build a suitable DCM model for agricultural university libraries of Bangladesh, exploring the present status, problems, ways to overcome the problems and prospects of the DCM system of the libraries. Libraries in Bangladesh are at the crossroads of the digitization system (Rahman et al., 2015). DCs are used on a small scale in Bangladesh comparing with the printed materials as the number of DC is not sufficient in libraries. Hopefully, the scenario is changing. Since, DCs have been able

to address the problems of the paper-based library system by offering facilities like round the clock availability, taking away physical bounding, multiple accesses, easy information retrieval, provision of unlimited storage space, networking of operations and low cost of maintenance. Therefore, the number of DC is expanding every year. But a proper model has not yet been developed for providing effective and efficient DC services for the library users. In this era of DC the shift to digital access for current information needs has been rapid and it can be predicted to see the trend of extending usages of e-resources that within the next ten years, the average academic library collection profile will provide access to at least 80% digital content and increasingly less than 20% print resources. So, this is the right time to take proper initiative for building a common model of DCM for the agricultural university libraries of Bangladesh. The proposed model might be very useful for the university libraries of Bangladesh especially in the agricultural university libraries of Bangladesh. It will help the users to get much information with less effort and will help the authority of those universities saving money and manpower. According to Islam (2013) if the libraries of Bangladesh want to move forward for a catch up the modern library trends and facilities, satisfying the users and as a whole wants to make its mark for the overall development of the country this is the time to march ahead.

Author Statement

The authors declare that they have no conflict of interest.

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