Chapter 2

Literature Review

2.1 Introduction

A literature review is an important part of a research study where the existing literature on a particular study area are searched and reviewed accordingly. This helps in gaining an insight of current knowledge as well as theoretical and methodological contribution to a particular area of study. These literature reviews are mainly based on the secondary sources available in different formats, and it does not state any new or original experimental work.

To review the literature on the study area based on the title ‘Management of manuscript collection in Assam in digital era: A practical approach using ICT tools’, both the printed and digital resource have been covered. In this Chapter, analysis of the research output and information published in the area of manuscripts and other related aspects of their management in the digital era has been incorporated.

Literatures are searched and analyzed within different phases covering the whole area of the study. The existing publications are reviewed and are summarized mentioning their critical analysis reflecting on them. Review of these existing resources gives an outline of the present status of this research area and its future scope for development. A collection of resources representing different aspects of the study area has been scrutinized and documented below. The publications under each phase are arranged according to the date of publication.

2.2 Manuscript

Manuscript means the hand-written document. Before the invention of printing machine, people used to write on different medium like clay tablets, metal plates, birch bark, palm leaf, sanchipat, tulapaat, cloth, paper, etc. which have now
become a valuable source of information about the past. The National Mission for Manuscripts also defines manuscript as the handwritten documents containing knowledge which are at least 75 years old. They are rare in nature.

In ‘Manuscript transcription assistant’ Ho (2003) and his co-authors write about various issues of management of the manuscript collection of a library in detail. They rightly explain the significance of manuscript collection as, “There are many reasons why manuscripts are important to our society. There are many purposes in keeping manuscripts intact. Manuscripts are our only way back to the past; they are our eyes to things that have already happened.” The importance of such manuscripts is mentioned “Manuscripts serve as primary first-hand documentation and evidence of the events, decisions, ideas, and actions that shape the development of a society or community.” Conservation and preservation of such collection is very inevitable issue. “These ancient writings must be preserved and maintained in order to access the past. Everything in the past depended on writing based on the spoken word. Manuscripts tell us what happened in the past. Manuscripts are a potential key to discovering knowledge from a hidden past, and are usually stored in large libraries for safekeeping and preservation.”

On the other hand, Minicka (2008) defines manuscript as, “A manuscript is always more than just its textual information – it is a living historical entity and its study a complex web of interrelated factors: the origins, production (that is, materials, formats, script, typography, and illustration), content, use and role of books on culture, educated and society in general.” In the paper ‘Towards a conceptualization of the study of Africa’s indigenous manuscript heritage and tradition’, the author describes the practical experiences assembled as a conservator in the South African Conservation Technical Team of the Timbuktu Rare Manuscripts Project.

M’kadem and Nieuwenhuysen (2010) write a paper ‘Digital access to cultural heritage material: Case of the Moroccan manuscripts’ where they mention about the manuscript collection of Morocco and its importance in the society.
“This material offers a window into the society and its intellectual tradition and history from the late seventeenth century onward. For decades, these manuscripts have been largely inaccessible and ignored. They are now under big threat from a variety of sources, both natural and human.” About the script and subject matter, the authors stated, “Many of the manuscripts are written in Moroccan Arabic script. Charts, diagrams, commentaries, and marginalia are abundant; some describe complex genealogies of local prestigious families and scientific theories, while others record intellectual disagreements among scholars, teachers, and commentators.”

Nosheen and Muzammil (2010) in ‘Manuscript collection in the Punjab University Library: Assessing management issue’ identify “the need for a proper planning to preserve and maintain this rare collection and the issues faced by the staff to digitize the manuscripts”. In this study, the authors try to explore the rare manuscript collection in the Punjab University Library, the largest collection of manuscripts in Pakistan. This collection comprised of more than twenty-two thousand items in multilingual and multi-format, including palm-leaf manuscripts.

The paper ‘Aluka: Digitization from Maputo to Timbuktu’ discusses about the project Aluka of African countries mentioning about the manuscripts of Timbuktu. The author, Ryan (2010) states “The manuscripts of Timbuktu, reflecting a rich intellectual and scholarly tradition, cover an unbelievably diverse range of topics, from the natural and physical sciences to the literary arts. The manuscripts reveal a sophisticated visual and technical artistry and often contain complex charts, diagrams, and genealogies. These treasures add greatly to understanding Africa’s diverse history and civilizations.”

Seifi (2011), in her paper ‘Digitization and digital preservation of manuscripts and access in organization of libraries, museums and documents centre of Astan Quds Razavi Library in Iran: A case study’ explains the importance of manuscript collection as on of the important source of cultural heritage with the special reference to Iran. “Manuscripts are one of the precious materials of our
cultural heritage. They are valuable sources for the reconstruction of the history and culture of a country. They reveal their contemporary society and provide a vital link to culture and knowledge.”

In the paper ‘Preservation of Sarawak manuscript’, Ngau Ing (2011) and his co-authors explain the manuscript collection of Malaysia. The values of these manuscripts are stated as “Manuscripts are seen as the historical evidence of the past on the social event, government event and the development of a nation. Obviously, manuscripts are the evidence-added value that contributed to the growing social events and government events and its development.” Therefore its proper preservation is a need of the hour. But the preservation of a manuscript is a very challenging task due to its unique physical nature. “Preservation of manuscript faces many challenges since the olden days due to improper arrangement, technology obsolescence, and lack of professionals involve in the preservation process. Manuscript curators also face daily challenges such as lack of expertise, funding and time. It is crucial to determine which manuscripts are worthy for a long-term preservation. Since manuscripts also one of the evidence-added value, preserving them are the most important thing to consider.”

Abdulkareem (2013) and his co-authors explain the need for preservation of manuscripts along with special emphasis on the Arabic manuscripts of Nigeria. In the paper ‘Challenges of digital preservation of manuscripts to the Nigerian Education and Information Systems’, they write, “Manuscripts play a significant role as records of human knowledge; they are firsthand original documents found in individual, institutional, and organizational collections. The need for manuscript preservation is, therefore, paramount to the cultural heritage of the past and for future generations.”

The manuscript section in a library is one of the important sections as it holds the history of a particular country or a region. The Manuscript Division of Library of Congress is one of the biggest manuscript repositories which reflect the history of America in detail. The website of the Library of Congress (http://www.loc.gov/rr/mss/, 2014) explains regarding the collection of this
division as, “The Manuscript Division's holdings, approximately sixty million items in eleven thousand separate collections, include some of the greatest manuscript treasures of American history and culture and support scholarly research in many aspects of political, cultural, and scientific history.”

2.3 Manuscript collection in India

India is one of the largest repositories of manuscripts produced in different languages and in scripts. These manuscripts are treated as rare commodities and a sense of religious sanctity and reverence are associated with them and different communities still worship the manuscripts as relic.

In the paper ‘Manuscript literature in Indian language’, Saini (1969) states the originality of Indian manuscript as “The genesis of Indian manuscripts dates back to some 4000 years since Sanskrit had been flourishing as a living language with enormous literature to adorn its studies.”

Chakrabarty (1996) in ‘Role of Ancient libraries in India: With special reference to Museum's manuscript collection’ describes the ancient Indian libraries and their manuscript collections. The impact of Buddhism, library development during Mugal period etc. are highlighted in the paper. The author reveals, “The only ancient library in India, which is still preserved, is that of Tanjore in South India dating from the end of the 16th century. It contains 20,000 manuscripts written in Devnagri, Telegu, Malayalam, Bengali, Kashmiri and Oriya scripts.”

In the paper, ‘Digitisation of Marathi manuscripts’ Deshpande and Panage (2001) discuss the importance of manuscript collection and their digital preservation highlighting the existing precious manuscript collection of Jayakar Library of University of Pune, Maharastra. The manuscript collection of this library holds around 5000 manuscripts, including about 700 Marathi manuscripts.

These collections of rare manuscript reflect the rich culture and tradition of this country. Kumar and Shah (2004) in the paper ‘Digital preservation of manuscripts: A case study’ mention, “During the history extending over 5000
years, India has produced a large wealth of literature. This vast knowledge
treasure was written on different kinds of material like birch bark, palm leaf,
cloth, wood, stone, and paper, etc. India perhaps has one of the oldest and largest
collections of manuscripts in the world.”

The website of the National Mission for Manuscripts (http://www.namami.org,
2007) also explains the historical aspect of Indian manuscripts as “India's
manuscripts have for centuries captured the imagination of the world. As early as
the seventh century Chinese traveller Hiuen Tsang took back hundreds of
manuscripts from India. Later in the late eighteenth century, the Nawab of
Awadh gifted a superb illuminated manuscript of the Padshahnama to King
George III of England.”

Chopra and Narang (2007) in a paper entitled ‘Digital preservation of archives
and manuscripts: An Indian scenario’ mention about the richness of Indian
manuscript. “India has an excellent wealth of ancient literature approximately
20% of the total world literature is in India. Before the establishment of National
Mission for Manuscripts, National Archives of India was also looking after the
manuscripts.”

In the paper ‘Indigenous knowledge from heritage texts: A case study of the
Asiatic Society Library, Kolkata’, Das and Chatterjee (2009) discuss the
manuscript as a source of indigenous knowledge with special mention of the
manuscript collection of the Asiatic Society Library, Kolkata. “The manuscript
collection of the Asiatic Society Library is rich and varied, and covers most of the
Indian languages and scripts and even several Asian languages.”

In other paper ‘Preservation and access to Indian manuscripts : A knowledge
base of Indian cultural heritage resources for academic libraries’, Gaur and
Chakraborty (2009) reveal details about the preservation status of Indian
manuscript and the initiatives taken by IGNCA and NMM, the two apex bodies
for management of manuscript collection in India. Moreover a large number of
manuscripts are there in outside India. “Outside India, Sanskrit, Pali and Prakrit
manuscripts are available in almost all the famous libraries in Europe, Japan, Srilanka, Pakistan, Bangladesh, Thailand, Myanmar, etc.”

Palm leaf is used as writing medium in ancient India. Mohite (2010) in the paper ‘Use of ancient Indian art in modern advertising’ writes, “Talapatra or palm leaf was used during the eleventh-twelfth centuries A.D. for preparing Hastalikhita –Sachitra manuscripts. From the fifteenth century onwards paper was used in place of palm-leaf for writing the manuscripts.”

Nayak (2010) in the paper ‘Narrative scenes in palm leaf manuscripts- a search in Prof. N. K Sahu Museum, Sambalpur’ explains the variety of the manuscript on palm leaf a writing material in ancient and medieval India available in Oddisha. These manuscripts are on “varieties of indigenous knowledge systems ranging from literary narratives like epics and puranas to technical works on tantra, medicine, architecture etc.” Indian manuscript are on “various categories of learning like Srutis, Smritis, Astronomy, Astrology, Grammar, Lexicon, Epics, Puranas, Kavyas and Alankaras, Dance and Music, Arithmetic and Architecture, etc.”

In another paper ‘Digital preservation of manuscripts in Rampur Raza Library in India: A case study’, Seifi (2010) explains the need of digital preservation of the manuscript with a special emphasis on the manuscript collection of the Rampur Raza Library. This Library, situated in Uttar Pradesh is one of the World’s magnificent, unparalleled repositories of cultural heritage and treasure-house of knowledge contains very rare and valuable collection of manuscripts along with other miniature paintings, astronomical instruments and rare illustrated works in Arabic and Persian languages.

Tripathi and Mishra (2010) in ‘Retrospective conversion of ancient knowledge, issues and challenges: A case study of Central Library, Banaras Hindu University, India’, discuss about the importance of manuscript preservation and their access with a case study of the central library of Banaras Hindu University. They explain, “The content and style of manuscripts echo the changing concerns
of society. They are required to be documented, preserved, and made accessible to the present and succeeding generations to reinstate the glorious past.”

Regarding the nature of the Indian manuscript collection, Chauhan and Chopra (2011) in their paper ‘Digitization of resources in university libraries in India’ explain “India possesses more than five million manuscripts, probably the largest collection in the world. These cover a variety of textures, themes and aesthetics, languages, scripts, calligraphy, illustrations and illuminations. These manuscripts lie scattered across the country, in numerous institutions as well as private collections.”

In the paper ‘Oriental wealth in selected libraries of Srinagar: A survey’, Mirza, Khan and Ali (2012) state the status of manuscript collection of Srinagar of Kashmir Valley. This survey based study reveals that the manuscripts preserved in 18 principal libraries of this Valley are mainly written in the Urdu, Arabic and Persian languages and the theme of these manuscripts are religion, literature and history. Regarding the digitization, the authors also add that the Oriental Research Library has initiated the process of digitization.

India is a place of huge collection of manuscripts which are scattered in different repositories of India. Shafi and Lone (2012) in their paper ‘Oriental manuscripts in India: A literature survey’ mention about the Indian manuscript collection as “The study revealed India as a place of great importance in terms of manuscript repositories. Sanskrit, Persian, Arabic, Urdu and other oriental manuscripts are finding places in almost every library, whether that is a university library, public library or a research library in almost every state of India. The manuscripts are available in different oriental languages like Sanskrit, Urdu, Arabic, Turkish, Persian and so forth.” On the basis of a survey carried out by the Indian National Trust for Art and Cultural Heritage (INTACH) in 1988-1990, Dr S. C. Biswas and Mr. M. K. Prajapati has estimated “the total number of manuscripts in India are 5,000,000; the number of manuscripts recorded in catalogues are 1,000,000; percentage of manuscripts languages wise include Sanskrit 67 per cent, Arabic/Persian/Tibetan 8 per cent and other Indian languages 25 per cent.”
The National Library, Kolkata also preserved a large number of manuscripts in its Rare Book Division. The website of National Library, <http://www.nationallibrary.gov.in> states, “National Library has about 3600 rare and historically important manuscripts in different languages. These manuscripts are preserved separately along with other important and rare books in the Rare Books division.”

2.4 Manuscript collection in North East India

The North Eastern States are treated as the living museum of people of different castes and creeds. This region of India has also a huge collection of manuscripts. In the book ‘Traditional science material culture of early Assam’, Baishya (2009) makes a thorough discussion of the writing tradition of ancient Assam covering all states of North East India. The author focuses on the uniqueness of different writing medium, materials and inks of that period. He states “North East India is known for producing special and indigenously developed types of paper, writing ink, painting material and innovative processes to preserve manuscripts and paintings. The idea of laminating paper or book covers by using red shellac is also regarded as an indigenously developed technology of this region.”

2.4.1 In Arunachal Pradesh

Motebennur and Devi (2006) in the paper ‘Buddhist Manuscripts of Arunachal Pradesh and Manuscripts of Manipur: Problematic of restoration and digitization’, discuss about the manuscript collection of two North Eastern State i.e. Manipur and Arunachal Pradesh, and the problems of restoration and digitization in modern context. Regarding the manuscript collection of Arunachal Pradesh, the authors state “Most of these manuscripts are hand-written on the paper which was also hand-made from the bark of a tree called ‘sheng’”.

In another paper, ‘Digital preservation of Mahayana Buddhist manuscripts of Arunachal Pradesh: Strategies, issues and challenges’, Motebennur (2009) discusses about the Mahayana Buddhist manuscripts of Arunachal Pradesh in detail. He clearly mentions regarding the importance of the manuscripts as “The
importance of Buddhist manuscripts cannot be overestimated from the simple fact that these manuscripts contain ideas regarding cultural interaction of North East India with Tibet and parts of South East Asia."

2.4.2 In Manipur

In the paper ‘Digital preservation of cultural heritage collection: An emerging trend’, Singh and Devi (2009) mention about the ancient manuscript with special reference to the manuscript collection of Manipur. “Manipur has a rich cultural heritage rooted in the ethos of religious, cultural and social customaries of the community since time immemorial. The manuscripts are the major important essences that help to know the cultural heritage of Manipur.” Regarding the status of the manuscript the authors state that most of these are in private collection and these should be preserved and digitized for their future use.

Private collection of manuscripts in Manipur is very rich in nature. Devi (2013) enlightens the need of preservation of such private manuscript collection. In the paper ‘Preserving the past and building the future: The role of private custodians of Manipur manuscripts’, she explains, “The value of manuscripts in the society is manifold as it obliges as a unit of the world memory and promotes the intellectual heritage. It also acts as a gateway and repository of knowledge to serve the indigent scholars.” These manuscripts belong to various subjects which are mainly written in Meitei script. She again states “the manuscripts in Manipur covers almost all the subjects like Administration, Arts and Culture, Astrology, Charms and Mantras, Creation, Lexicography, Fine arts, Earth science, Genealogy, Poetry, Prediction, Prose, Religion and Philosophy, Meitei scripts, Supernatural stories, Meitei confederacy to Family Genealogies.” Regarding the present status of the manuscript of the State, she writes, “These materials are found to be very rare in nature and very fragile so it is necessary to organize and manage these invaluable resources.”

2.4.3 In Mizoram

There are a large number of manuscripts written in Chakma script in Mizoram. For their documentation and preservation, National Mission for Manuscripts has taken various steps. In the Ninth Annual Report (2011-12), National Mission for
Manuscripts, it is stated as, “In January, 2012, NMM organised a 10-day workshop on the Chakma script along with an exhibition of Chakma manuscripts on indigenous medicines at Kamalanagar, nearly 200 km. from Aizawl.”

2.4.4 In Sikkim

In Sikkim also, a number of rare manuscripts, mainly related to Tibetan culture and Buddhism are preserved in the Namghayal Institute of Tibetology (NIT) located at Gangtok. In a souvenir published in 2008 on occasion of the Golden Jubilee of this institute of Sikkim mentioned about this repository of Buddhist manuscripts in detail. The website of the Institute <http://www.tibetology.net>, accessed on 30 September, 2014> mentions that the manuscripts inscribed and decorated with silver and golden scripts and images are also preserved in this Institute.

2.4.5 In Tripura

In the paper ‘Social history as revealed in the manuscripts of Tripura’, Das Sastri (2011-12) explains the manuscripts available in the state of Tripura. Most of these manuscripts are written in Sanskrit and Bengali; manuscript written in Kok-Borok, a tribal language manuscript is also found in Tripura. Regarding the history of the manuscript of Tripura the author states, “Rajmala, Vol. 1 (1st Lahara ), the historical chronicle of the kings of Tripura, which was compiled in the first half of the 15th century AD is perhaps the first known manuscript of the State.”

The literature regarding the manuscript collection of Meghalaya and Nagaland has not been found during the study period. There is a scope for further study regarding the availability and the status of the manuscript collection of these two states of NE India.
2.5 Manuscript collection in Assam

In ancient Assam, the manuscripts were written under the patronage of the kings as well as the Satras. In ancient Assam, the bark of Agar was used as a writing medium popularly known as sanchipat and the Satras are the major custodians of sanchipatia puthis i.e. manuscript written on sanchipat. Two words, i.e. Satra and sancipat are associated with the manuscript collection of Assam. Besides the Satra, these manuscripts are mainly preserved in temples, madrasas, monasteries, museums, libraries and archives, etc.

Edward A. Gait in his book ‘History of Assam’ describes about the manuscript collection of Ahom period. Gait (1906/2004) writes, “When the Ahoms invaded Assam at the beginning of the 13th century they were already in possession of a written character and a literature of their own. The use of paper was unknown, and they employed instead strips of bark of the saci tree...”

In an article in Assamese, ‘Satriya Chitrukala’ (Art of Satra), Das (1963) mentions the use of different media like sanchipat, tulapat even the Muga cloth as writing on materials of the manuscript collection of Assam. Illustration is another characteristic of Assamese manuscripts and the ‘Sachitra Bhagabata’ preserved in Bali Satra of Nagaon district is the oldest of its kind as he states in his article.

In his article ‘The art of manuscript preparation and illumination’, Neog (1965) gives a description of Assamese manuscript. The author mentions about the patronage of Ahom kings, Koch rulers of Cooch Behar and Darrang and the Buddhist in the preparation of the manuscript in Assam.

In Assam, the tradition of writing on sanchipat manuscript is there from as early of the 7th Century. In the book ‘Ancient treasure of Assam through Assam State Museum’, Choudhury and Das (1984) state that the Sanchi bark was used as early as in the 7th century AD. “Kumar Bhaskarvarman, the ruler of Kamarupa of the 7th century A.D., a friend and ally of Harsha of Kanauj, presented to the latter
volumes of five writings with leaves, made from Sanchi bark and the hue of the ripe cucumbers.”

In an Assamese article ‘British Juktarajyat Asomiya purani haate likha puthi aru nisiddha chopa puthir sangrakshan’ (Assamese rare manuscripts and banned printed books preserved in the United Kingdom), Buragohain (1992) mentions about her personal experiences of coming across some rare Assamese manuscript as well as banned Assamese books preserved in the India Office Library and Record, School of Oriental & African Studies and the British Library in the United Kingdom.

Choudhury (1995-96) in his paper ‘Assam school of manuscript painting: The heritage of Vaisnavite culture of Assam’, explains about the manuscript specially illustrated manuscript of Assam. Regarding the value of this manuscript the author mentions, “The paintings which are depicted as illustrations in old manuscripts have all the qualities to occupy an important place in the art of history of India.” But due to the conservative thoughts of the Satras, the British Administrator-scholar may not be attracted by these manuscript collections. “The era of the study of the manuscript painting was heralded by the publication of the Descriptive Catalogue of Assamese Manuscripts in 1930 by the Calcutta University. This book was edited by Hem Chandra Goswami.”

In another paper ‘Manuscript painting of Mahapurusa Srimanta Sankardeva (AD1449-1550)’, Barua (2004) discusses about the manuscript tradition of Assam during Vaisnavite period. Regarding the materials used for writing during that period are explained as, “The religious books were written on Sanchi bark, Tula pat, (hand-made cotton or paper) and sometimes on Muga pat (special kind of golden silk cloth). Ink used was deep black silikha fruit mixed with ashes of bora rice (sticky type) which is never damaged by rainwater or eaten by insects but remains for a longer period.”

Talukdar (2004) discusses about the manuscript collection of medieval period of Assam. In the paper ‘Writing materials and preservation of Assamese manuscripts in the medieval period’, the author explains that in that period the
sanchipaat was the principal writing-media; besides that, tulapat, taalpat, copperplate, even in bamboo strip, and ketaki patra were used as writing media.

Some Assamese manuscripts are now preserved in different libraries or archives of the abroad. In the book ‘Oriental manuscripts worldwide’, Ali (2005) mentions two libraries, i.e. British Library and the Dhaka University Library which possess Assamese manuscripts in their valuable manuscript collection.

The National Mission for Manuscripts has been working and organizing different programmes in Assam for manuscript preservation as well as building mass awareness regarding the importance of their preservation. The news published in Assam Tribune (Nov. 21, 2014 pp.7) reports, “Under the auspices of the National Mission for Manuscripts, a lecture on the importance of manuscripts in the study of history with special reference to south Assam was held at the auditorium of Hailakandi Women’s College on Sunday.”

In Assam, some academic libraries also preserve the manuscript collection of their locality.

Mahanta (2006) in his paper ‘Art objects preserved in the cultural museum of Kaliabor College with special reference to miniature manuscripts’ explains the collection of Sanchi manuscripts collected and preserved by the Kaliabor College of Nagaon District of Assam. “There are a total of 40 manuscripts on Sanchi folios in the museum out of which five are illustrated. The manuscripts are of various sizes and invariably rectangular shaped.”

Saikia and Kalita (2011) in their paper, ‘Prospects of digitizing manuscript collections in K K H Library: A model’ show the prospects of digitization of manuscript collection with special reference to the manuscript collection available in the K K H Library of Gauhati University, Assam. This Library acts as a repository of a unique manuscript collection. “The total number of manuscripts is about 4,500 copies. These collections are mostly 200-300 year old and a little fraction is of 400 years old. The script of these collections is old Assamese and languages are Assamese, Sanskrit, Bengali, Nepali and Tibetan.
Manuscripts are primarily available in Sanchipat, Tula pat, Palm leaves, and hand-made paper.”

In the book ‘A catalogue of manuscript in Assam’, Goswami (2012) mentions regarding the status of manuscript preserved under personal collection. She mentions “Manuscript owners are not willing to reveal their treasure due to their superstition and attachments to their property.” This lack of cooperation creates lots of problems in the documentation and their proper preservation.

2.6 Management of manuscript collection in digital environment

Application of information technology for the management of manuscript can be studied basically from three perspectives, i.e. creation of bibliographic databases, digitization, and online access of digitized manuscript.

Albert, Barbero, and Pasini (2001) in their paper ‘From parchment to the network: Manuscript management and cataloguing’ explain the application of IT in manuscript management. But this trend of using particular software for management of manuscript collection is comparatively new. “In 1997 no software system was known devoted to management of manuscript documents.” They identify the following areas where IT helps in managing the manuscript collection, which are administrative tasks, catalogue management and publishing, a standard for manuscript description; and dissemination.

Aytac (2003) writes different aspects of digital libraries for the manuscript collection. In the paper, ‘Development of a user-centered digital library for Ottoman Manuscript’ the author mentions that the digitized document should be stored in an open internet environment as this mechanism allows rare and valuable documents to be accessed easily by a large number of geographically distributed users. He also emphasizes on the quality management of such online system and gave some parameters for their measurement. “The quality of digital library services for Ottoman can be measured in various ways: these include user satisfaction, service available 24x7, information reliability, information system security and user-centered interfaces.”
‘Creating a digital library to handle Malay manuscripts using Greenstone’ is another paper where Rifin and Zainab (2007) describe how the Greenstone Software can be applied to ensure accessibility and use of manuscript collection. The authors explain the importance of its availability over internet as “the storage of digitized documents in the open Internet environment is an important mechanism for allowing valuable and rare documents to be accessed easily by a large number of geographically distributed users.” The manuscripts themselves are naturally deteriorated with the passing of time and due to exposure to unsuitable environment over the years. In such case “Digital library of manuscripts provide new possibilities and paradigms for access to information, knowledge dissemination, and to stimulate collaborative learning and research.”

For the management of the manuscript collection, digitization is one of the measures followed by different libraries. Bansode (2008), in his paper ‘Creation of digital library of manuscripts at Shivaji University, India’, elaborates it with the example of Shivaji University Library. “As the manuscripts are very old there was a need to store the wealth of collection in a proper manner, so that the materials can be preserved for future generations. Constant use of the rare materials decreases their lifespan. A decision was made to digitize the manuscripts and rare materials.”

Human resource is an important aspect of the manuscript management. The number of quality staff should be engaged in this process of manuscript management in the digital environment. Walton (2008) in the paper ‘Manuscript collections on the web’, explains regarding this issue as “Without arrangement and description there would be very little information to put on the Web for researchers to use, so the survey next asked how many of the total staff reported above actually perform arrangement and description tasks, how much time they spend on these activities, and how much time they spend adding manuscript information to the Web.”

The manuscripts are in a very brittle and fragile condition. As they are of ancient ages, most of them seem to be damaged. With the time, these become sensitive; therefore these should be handled carefully. Slowik (2009) in ‘Collecting
*medieval manuscripts*, writes about this as “Medieval manuscripts cannot simply be shipped from place to place or stacked like other books upon arrival. Each piece must be individually assessed for its fragility and material considerations, such as preventing paint from fading or flaking”. To manage this type of situation, IT can help in this regard. “To prevent unnecessary transportation or handling, many institutions have turned to digitization. That way patron can view the manuscripts without having to travel to the item, have the item travel to them, or touching the item in any way.”

The digital camera is a one of the important tools for digitization of manuscript collection. In the paper *Digital preservation of manuscripts in Rampur Raza Library in India: A case study*, Seifi (2010) states, “Before 1998, digital cameras were used, which could copy only a few pages and turns out to be quite expensive. From 1999, improved still cameras are used to meet the needs of in-house digital copying. National Institute of Advanced Studies (NIAS) used this method by digitizing Bhagavad Gita into two CD-ROMs.”

The paper *Virtual reunification as the future of ‘codices dispersi’: Practices and standards developed by e-codices - Virtual Manuscript Library of Switzerland* written by Austenfeld (2011) discusses how a virtual library helps in accessing the manuscript collection via web. The author explains this virtual Library as “…e-codices–Virtual Manuscript Library of Switzerland, which is to provide scholars and the general public with access to medieval manuscripts from all over Switzerland via a virtual library, as well as to the particular aim of the ‘codices dispersi’ sub-project, to bring together manuscripts of St. Gall origin and/or provenance within the context of the large website.”

### 2.7 Digital images of manuscript

Digitization of manuscripts means the conversion of manuscript to digital images. This is mechanically done either by scanning with digital scanner or capturing with a digital camera.
Maintenance of image quality is a prime aspect of manuscript digitization process. In that aspect, the resolution of the images should be right one. Kumar and Shah (2004) in the paper ‘Digital preservation of manuscripts: A case study’ state, “Resolution of image is measured in dot per inch (dpi). Higher dpi leads to better resolution and quality of image, but larger image file. 300 to 600 dpi are recommended for better resolutions. File compression is another important aspect because image capturing takes more space.”

Regarding the image quality, Shafi (2004) in the paper ‘Digitization perspective of medieval manuscripts’ explains as, “The picture is clear when one focuses on three components i.e. anatomy of image, image formats and digitization hardware and software. The anatomy of dots, pixels, resolution, bit depth, shade, etc. effect the quality of image.” An important issue of digitization is the file format. The digital image can be saved in different file formats, all with various merits and demerits. Regarding the file format, the author reveals that for archiving the file format should be in .TIFF format however the format like .JPG and .GIF prove ideal for web accessibility as they work in all browsers. Naming the digitized file should also be done logically. It should be indicative one and should be “meaningful and /or mnemonic conveying information about file and its relation to other files besides persistent and consistent.”

In the paper ‘Digital preservation of Indian manuscripts - an overview’, Ramana (2005) discusses regarding the image processing for digital images of manuscripts. He states, “The JPG file is small and compressed by 90% of the original size. Finally, the manuscript is put in E-Book Format, in which the PDF image files were tagged and a composite PDF file is prepared as per the original document pagination and sequence. The composite PDF containing the individual pages were in E-Book form, with the object of access.”

Kulovits(2009) and his co-authors in the paper ‘From TIFF to JPEG 2000? preservation planning at the Bavarian State Library using a collection of digitized 16th century printing’, reveal that the JPEG 2000 is the more usage file format for digital image file as this format reduces storage consumption through
lossless and lossy compression. “The National Library of the Netherlands (KB-NL) evaluated the suitability of alternative file formats such as JPEG 2000 to their currently used format uncompressed TIFF. The four aspects, required storage capacity, image quality, long-term sustainability and functionality were analyzed and JPEG 2000 is recommended as future archive format. The British Library recently moved forward to migrate their 80-terabyte newspaper collection from TIFF to JPEG 2000.”

2.8 Access to digitized manuscript

Access is a prime aspect of any digitization project. If the digitized manuscripts cannot be accessed, the digital images become useless. Accessibility makes digitization more popular as well as useful.

In the paper ‘Digital access to old manuscripts in the Memoriae Mundi Series Bohemica Programme’, Knoll (2000) mentions the importance of digitization of manuscript collection both for the access and preservation. He explains it as, “Digitization is not only data capture and easy access; it is rather a complex method that creates new independent documents, which have their own life. Once created, they have to be accessed and preserved over longer periods of time, because it is not possible to return again and again to capture the same items.”

The access and preservation are interrelated. Without proper preservation, the access of the manuscript is not possible.

Graham (2003), in the paper ‘Electronic access to and the preservation of heritage materials’, explains how digitization has brought changes to the heritage document including manuscript. He rightly mentions, “Without preservation, there will be no long-term access of the heritage material.”

There should have proper scope for easy access (search and retrieval) for the digitized manuscripts. ICT brings both the features of preservation and access to some extent. Roegiers (2003), in the paper ‘Integrated resource discovery and access of manuscript materials: The user perspective’, writes, “Recent
developments in ICT have given hope to users of manuscript materials that some of their old problems will now be solved.”

Jefcoate (2003) in the paper ‘Preservation of access? Developing strategies for microfilming and digitisation’, clarifies how the digitization can help the researcher of manuscript in different ways. He states, “High-definition digital images of unique material could not only improve access in the sense of the making an accurate facsimile available at a distance from the original; digital photography was also opening up access to parts of the text invisible to the naked eye, enabling new ways of examining and researching the manuscript.”

Varniene and Daugiala (2007) in ‘Development of cultural heritage digitisation and access: Lithuanian approach’, explain the importance of digital access historical documents like manuscript as, “The communicative power and authentic and tangible value of old texts, historical documents, works of textile art, drawings and other artistic and historical objects of cultural heritage can be brought to their full expression in a synergism of their digital presentation. Digital format increases their access possibilities, increases their additional value and ensures their durability.”

Magan (2011) and his co-authors write, “If users access digital copies instead of the original materials, then the handling of original books is kept to a minimum and the preservation function comes into play.” In the paper ‘Mass digitization at the Complutense University Library: Access to and preservation of its cultural heritage’, Magan and his co-authors discuss the various aspects of mass digitization process of Complutense University.

In her thesis ‘Digitization and digital preservation of the heritage collection in select libraries in India and Iran: A comparative study’, Seifi (2011) discusses the status of digital preservation used in two countries i.e. India and Iran. In this study, it is revealed, “With regard to the principal reasons for digitization of heritage collection, it was found that, 15 Indian and Iranian libraries digitized heritage collection to ‘enhance access’.”
In ‘Cultural heritage and the public domain’, Savenije and Beunen (2012) explain the need of public access of cultural heritage like rare manuscript collection. In support of this they write, “Providing access to cultural heritage is a task that serves the public interest. Cultural heritage institutions participate in successful resource sharing cooperatives that make content widely available. Providing access free of charge to Public Domain works seems an obvious course.”

Wafaye (2012) in his paper ‘Open access and museum: A study of Central Asian Museum (CAS) at University of Kashmir’, states, “online environment is far better and faster than any other sources and information online adds to its prestige. The richness of any society is revealed by its history. Many civilizations and nations share this wealth of knowledge and efforts are needed to explore and provide access to the wealth of knowledge at global level.”

Mustafa (2013) in his book ‘Oriental libraries of India in internet age’ discusses about the ICT application in different oriental libraries of India where the manuscripts are also preserved along with other oriental literatures. The author mentions, “The collection of manuscripts preserved in these libraries is not only pride of any nation but also a primary source of information. The accessibility of these manuscripts is diminishing because these have not been provided a sound platform through which world populace identify and utilize it.”

2.9 Google Sites

Google Sites is an online tool or a platform where one can design a webpage using plain text with minimum or no knowledge of HTML. In this ‘Log-in’ based system, one can customize the pages with preloaded template.

The Google Sites is a ‘SaaS’ which is applied as a knowledge management tools in different libraries. In a paper titled ‘Software as a service: Analysis of ‘Google Sites’ as KM tool for academic environment’ where the application of “Google Sites for suitability as the knowledge management tool” is discussed. In this paper, Farooqui (2008) indicates that most of the academic institutes face mainly
two common problems, *i.e.* financial problems and the technical problems, in introducing different ICT tools in knowledge management. In this regard the author mentions that the “Google sites is the best solutions to face both the common problems”.

‘Google Sites & chrome for dummies’ is a very useful hand-book for Google Sites users as it includes all the features as well as the process of designing a site using this platform. Regarding the up-gradation and quality maintenance of this Google Sites, Teeter and Barkdale (2009) explain, “Like many other services offered by Google, Sites is a *perpetual beta*. This means that the clever Google engineers are always improving the way Sites works by adding new features and changing ones that aren't as helpful.”

Jensen (2013) in the paper ‘Managing library electronic resources using Google Sites’ explains how the Google Sites has been applied for the management of the electronic resources in the University of Alaska Fairbanks Libraries. The author rightly mentioned this application of Google Sites as “this home-grown system’s ability to meet them, harnessing the power of a Google search to make it an effective and streamlined short-term solution.”

In the paper ‘Using cloud infrastructure to support higher education: A case study of managing a course web page with the Google Sites’, Pjanic (2013) and the co authors elaborate how a university course can be managed incorporating different Google cloud services within the Google Sites. Pjanic (2013)...et al. write, “Google Sites provides a simple site creation system by which teachers alone can design, implement and manage websites for their courses. The Sites can be easily combined with other Google tools in order to incorporate documents, spreadsheets, calendars, forms, maps, video and a range of interactive gadgets into the course web pages. Google Sites management and creation system allows the creation of different types of web pages based on predefined templates, which additionally accelerates the course sites creation process.”
2.10 Google Drive

Google, basically a search engine provides different services and the newly added cloud based service of Google is Google Drive. This log-in based platform which enables user cloud storage, file sharing and collaborative editing on web has been released on April 24, 2012. This Drive is integrated with other Google services/products, which gives the provision to upload and share the files and folders of videos, docs, spreadsheets, presentations, etc.

Kulikowski (2012) in his paper ‘Using Google Drive for library communication and collaboration’ explains how the Google Drive can be used in the various activities and functioning of a library. He shows the step-wise process of using Google Drive with some screenshot. Regarding the Google Drive, the author states, “It’s a program that allows you to create and store documents in the cloud for free. With an Internet connection, you can access your documents and files from any computer. Additionally, individuals can work on a shared document together in real time.”

In another paper ‘Cloud epoch: Storage as a service’, Singh, Sarma & Kaur (2012) define, “Google Drive is a freemium cloud storage service that is integrated with the company's other services and systems, including Google Docs, Gmail, Android, Chrome, YouTube, Picassa, Google Video, Google Analytics and Google+ . Google Drive, which enables a seamless browser-based interface between the user’s files and applications…”

In the paper ‘An empirical study of implications of cloud computing applications in libraries using diffusion of innovation theory: Determining factors of adoption’, Yuvaraj (2013) mentions the various application of cloud computing in libraries as “There are various cloud-based tools for reference service needs of the libraries such as ‘cloud-based video services’ (e.g., YouTube, TeacherTube), ‘information collection services’ (e.g., Google forms) and ‘file sharing services’ (e.g., Dropbox).”
2.11 Summing up

The literatures covered in this review are in form of a journal article, conference article, editorial, book chapter, book, etc. The websites, newspapers, etc. are also taken as a source of information in this regard. The study on manuscript is not a new one, but very selective in nature, so the literatures are not sufficiently available, especially related to the manuscript of Assam. Writings in the Assamese language are also reviewed especially for this area.

In this present review, only selected literatures on manuscripts as well as other related areas have been analyzed and all are included in the References & Bibliography.