DIGITAL LIBRARIES INITIATIVES IN INDIA: DIGITAL TECHNOLOGY ACCEPTANCE IN TRANSFORMATION OF UNIVERSITY LIBRARIES AND HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

Industrial Revolution 4.0's technological advancements have permeated higher education institutions (HEIs) and forced them to deal with a digital transformation in all aspects. Since the recent past, digital transformation approaches to the HEI domain have attracted attention because they enable us to define how players in a technologically assisted education domain interact with each other. Knowledge management and preservation of indigenous culture and historical items have emerged due to the rise of the Internet, as has the notion of Digital Libraries (DLs). An important part of today's global information infrastructure is a network of Digital Libraries that use the newest ICT to create an organizational structure that enables academics and researchers worldwide to share material. An array of digital library projects and digitization programmed has been launched all around the nation in India. The government supports the majority of digital library projects. In addition, the Digital Library of India was developed by the Ministry of Communications and Information Technology. India's digital libraries face various difficulties and obstacles, and this study examine them.

Keywords: *digital transformation; digitalization; university; higher education institution, Digital Library, ICT, Knowledge Management, Digital Library Initiative (DLI),*

I. INTRODUCTION

Power and wealth are linked to information, which is seen as a fulcrum for economic and social growth in society. An Information and Communication Technology revolution has helped close the knowledge gap by making information more accessible. A digital library was born due to this technological revolution since knowledge could now be delivered at higher speeds and lower costs through digital means. As a result, more traditional information may be archived, made available for digitization, and preserved. The proliferation of digital libraries worldwide was bolstered by open-source software movements.

Traditional knowledge was being studied, recorded, maintained, and made available via digital archives in one form or another. At that time, the Digital Library Initiative (DLI) was launched by the National Science Foundation (NSF), DARPA, and NASA, as a collaborative effort. Six institutions received funding for the exploration and development of underlying technologies for digital libraries [1].

In February 1998, the second phase of the project began. In 2003, Devika (Devika) wrote: Several notable initiatives, including the CMU, MERCURY project, Cornell University's TULIP and ENVISION projects, Yale University's Open Book Project, the Networked Digital Library of Theses and Dissertations (NDLTD), the National Science, Mathematics, Engineering and Technology (SMET) Education Digital Library, and the National Policy, Library history research in India has been ignored despite the country's long and distinguished history of libraries. The explosion of information and the ongoing advancements made possible by Information and Communication Technology (ICT) have altered library systems throughout the country. Traditional library systems have undergone a paradigm change due to ICT technologies, digital resources, and the Internet. Collection creation, technical processing, archiving, and access have all been affected. Traditional libraries are adapting to meet the evolving information needs of today's users. Standard libraries in India are being reshaped and modernized with a great deal of effort. An investigation on turning university libraries into knowledge resource centers is being carried out.ICT systems are essential to the digital revolution's vast range of information and knowledge goods, services, and offerings in enterprises. Because of technological advancements in digital systems, educational institutions and information management firms may now have virtual access to education and knowledge in new and innovative ways. Digital technology platforms have been built by higher education and learning institutions throughout the world to realize and attain the millennium culture and social value. These changes impact university libraries because of their projected position in information and knowledge management and distribution [3]. Educational institutions and information and knowledge-based businesses may benefit greatly from digital and social computing applications. Institutional repositories are redefining the role of higher education and learning and information management institutions in the modern digital environment and worldwide internet access, allowing them to preserve intellectual content [4] better.

Academic and educational practices are being affected across the board by the growing popularity of the Internet of things (Iota) and the Internet of Everything (IoE), which is playing an increasingly important role in supporting research, education, collection development, and dissemination of knowledge in academic institutions and public libraries. It has become more important for information professionals, such as librarians, to keep up with new developments in digital technology. However, university libraries confront enormous hurdles due to massive data repositories and a lack of creative new information technologies [5].It has always been a problem for universities to manage intellectual output, including academic research, journal articles, theses, and dissertations. However, today's IT systems encourage information organizations rather than impede social computing or electronic resources [6]. Information management corporations (IMC) and university libraries worldwide are working together to establish global digital projects as major centers for intellectual and scholarly exchange. [7]. we wanted to see how equipped university libraries and information professionals were for the current digital revolution and how we might help them become more compliant in the process. The research evaluated digital technologies and their uses, the popularity of the digital environment, the current information environment, and the roles and responsibility of information professionals. In the mid-1990s, India's digital library development was focused on conserving the country's art and cultural history. On November 2 November 2, 2001, the UNESCO General Conference endorsed unanimously a declaration on cultural diversity known as the UNESCO Universal Declaration on Cultural Diversity to improve access to varied cultural resources across the nation. With the help of Carnegie Mellon University and the US-Universal NSF's Digital Library project, Indian governments and nongovernmental organizations have taken significant steps to digitize, preserve, and share the vast pool of knowledge in the physical forms of manuscripts, rare books, out-of-print books and archival materials, as well as with neighboring South A. India is a member of the networked digital library for theses and dissertations (NDLTD). Websites featuring in-house digital information, such as research reports, publications by researchers, theses and dissertations, have been created by libraries and research institutions at higher education institutions. A practical way to establish workable digital libraries and maintain and operate these libraries as well as provide their services was established later on [8].

A. National Policy on Digital Library
Digital libraries in India can benefit from advice from the National Task Force on IT and Software Development (2003), which made important suggestions for the creation of a pilot Digital Library, preserving India's enormous traditional knowledge reserve, and safeguarding Indian theses and dissertations from infringement through copyright protection measures. There is no clear-cut national strategy on digital libraries in place despite this. An Indian national policy on Digital libraries is needed to provide a framework and best practices for establishing Digital Libraries across the country. The necessity for digital information rigidity in publisher rules and data formats, preservation policy, intellectual property rights policy for content creation and collection development policy are also important [9].

B.Current Digital Library Initiatives in India
India's progress toward digital library development relies on a wide range of institutions, including national level institutions, research organizations, universities, state government institutions, financial institutions, and other commercial institutions. Listed below are a few of the most important national digital library programmers and initiatives [10]:

Digital Library of Books
Digital Library of India (http://www.dli.ernet.in/): President A. P. J. Abdul Kalam publicly inaugurated the Digital Library of India on September 8, 2003, to conserve the country's knowledge and cultural history. It is a US-NSF-funded Universal Digital Library Project and the Carnegie Mellon University-led Million Books Project. The project is being funded and directed by the Indian government's Communications and Information Technology Ministry and the Indian Institute of Science (Bangalore). As a result of its three mega scanning centres and 21 scanning centres, it provides free access to all of the world's most important libraries, creative, scientific, and historical materials. Digital Library Portal creates and uploads the structured information for scanned documents, allowing users to search for and access the full-text contents. The Digital Library of India now has 4,803,335 volumes with 168 million pages in them. The works were written in various languages and covered a wide range of topics. IIT Hyderabad, ERNET (Education and Research Network) India, and the Centre for Development of Advanced Computing are among the participating institutions (CDAC) [11].

VigyanPrasar Digital Library: India's Department of Science and Technology formed VigyanPrasar, an independent institution, in 1989 to communicate science and technology. When it comes to disseminating new scientific knowledge, VigyanPrasar has an open-access digital library that contains full-text versions of all significant publications by VigyanPrasar, including 80 English books, 49 Hindi books, and 17 other languages, as well as audio and video content on CD-ROM. VigyanPrasar Science Portal has all of the back issues of the open-access magazine Dream 2047, published from its first issue in volume one. New Delhi's NCSTC, the NCSTC Network in Delhi, and the National Children's Science Congress are participating institutions.

NCERT Online Text Books: Since its inception in 1961, India's national and state governments have relied on the NCERT as an independent think tank to help them execute education-related policies, notably those aimed at improving the quality of education for the public school level. The Nationwide Council for Educational Research and Training (NCERT) has launched a national site where students and instructors may access free online textbooks based on the National Curriculum Framework 2005. This

gateway allows students to quickly access textbook chapters based on the book's title or topic matter. Under the limits of usage specified in the Copyright Notice, you may download the full book or individual chapters. The programmed makes it simple to obtain NCERT textbooks in Hindi, English, and Urdu for grades I through XII [12].

Digital Library of Manuscripts
Kalasampada: The Indira Gandhi National Center for the Arts (IGNCA) and India's Ministry of Communication and Information Technology have joined forces to develop Kalasampada, an indigenous cultural heritage digital library (Digital Library: Resources of Indian Cultural Heritage (DL-RICH). Digitized pictures from a wide range of cultural heritage materials are made available via DL-RICH. These include manuscripts and other documents and images from a wide range of other media, including paintings and sculptures, as well as audiovisual and multi-media resources. Access to various parts of the collection is available through this portal, an English interface and English transliterated metadata. Among the assets available to academics are 272,000 manuscripts, 100,000 slides, hundreds of rare books, 4,000 rare images, 400 hours of audio and video, fifty lessons developed by the IGNCA, and research papers and tutorials. The GaudiyaGranthaMandira, a Sanskrit text repository, contains more than 400 chapters from various eastern writings. An award given by the Indian government's Department of Administrative Reforms and Public Grievances to Kalasampada in the category of Best Documented Knowledge and Case Study was given in 2005 [13].

National Databank on Indian Art and Culture (NBC): After INGCA's second digitization phase, the National Databank on Indian Art and Culture (NBC), a pilot project of the Indian Ministry of Communication and Information (MCIT) and the Archaeological Survey of India (ASI), Government of India, was launched. ASI and the state archaeological departments provide digitized pictures and audiovisuals audiovisuals to NBC. Access to virtual tours of archaeological sites, the ASI magazine "Indian Archaeology - A Review," ASI publications, and rare literature in Indic languages (Hindi and Sanskrit) is also available via the site's online library. There are plans to cover over 1 million images, 1000 hours of audio and video, 25000 rare books on art, culture & archaeology & a walk-through of select ancient sites in this trial project.

National Mission for Manuscripts: With the National Mission for Manuscripts, launched in February 2003 by India's Culture Department and Ministry of Tourism and Culture, it is their goal to find and catalogue the country's vast collection of manuscripts in a variety of styles and media such as scripts and languages as well as their calligraphic and illuminating elements. In order to identify, inventory, preserve, and protect endangered manuscript collections, NMM has established a network of 47 MRCs (Manuscript Resource Centers), 32 MCCs (Manuscript Conservation Centers), 32 MPCs (Manuscript Partner Centers), and more than 200 MCPCs (Manuscript Conservation Partner Centers) across the country. 'Kritisampada' is the name of a national database of manuscripts maintained by the NMM. On the NMM website, there are now more than 20 million records. 3.2.4 A digital library and archive, Muktabodha (http://www.muktabodhalib.org/digital_library.htm). This project was started in July 2003 by the Muktabodha Indological Research Institute to preserve Tantric and Agamic literature and India's oral legacy of Vedic chanting, rituals, and philosophical understanding that go along with it. A primary objective of the Sanskrit Digital Library is to make a variety of important Sanskrit manuscripts and writings available for research by scholars all around the globe. Paper transcripts from the French Institute of Pondicherry of Shaiva Siddhanta, containing 210,000 digitized pages in almost 2,000 books, Vedic Manuscripts of Gokarna, 24 volumes in the South Indian scripts of ShaivaSiddhantaParipalanaSanghaDevakottai, 75 volumes of Kashmir Shaivism texts [14].

National Digital Library of Electronic Thesis & Dissertation
Shodh Ganga: Indian ETD Repository: An electronic theses and dissertations repository, Shodhganga, may be found here. The INFLIBNET Centre, with the help of the University Grants Commission, launched it on May 20, 2010, intending to make Indian theses and dissertations available to the academic community all over the globe. On June 1 June 1, 2009, the University Grants Commission (UGC) issued a notice to institutions requiring the electronic submission of theses and dissertations by their researchers. The INFLIBNET Centre hosts and maintains a collection of Indian intellectual output known as Shodhganga. 151 Universities have signed MoU with INFLIBNET Centre to join the Shodh Ganga project and deposit their theses. ShodhGangotri (http://shodhgangotri.inflibnet.ac.in/) is a repository maintained by the INFLIBNET Centre for approved synopsis submitted by research scholars to universities for registration in the PhD programme, to measure trends and directions of research being conducted in Indian universities and avoiding duplication of research. More than 11,000 electronic theses and dissertations are available via ShodhGanga. As the year's best ICT-enabled higher education institution, Shodhganga University was honoured with the India JURY CHOICE Award in 2011. Researchers may view more than 1712 summary submissions on ShodhGangotri [15].

Vidyanidhi Digital Library: Vidyanidhi is a gateway to doctorate research in India. The University of Mysore's Department of Library Science implemented the solution. NISSAN, DSIR, the Indian government, the Ford Foundation, and Microsoft India contribute to this effort. There were government, Ford Foundation and Microsoft India Archive of Dissertations and a collection of tools for doctorate research in India when launched in 2000 as an initial pilot project. The UGC also provides strategic assistance to Vidyanidhi (University Grants Commission). There are two parts to the Vidyanidhi Digital Library: a database of information and the whole texts of theses. Vidyanidhi is now home to almost 5,000 full-text theses and 50,000 bibliographic data from those submitted to Indian institutions.

Digital Library of Online Courseware

NPTEL: Seven Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc) have collaborated on an open courseware initiative called the National Program on Technology Enhanced Learning (NPTEL) (IISc). The Ministry of Human Resources Development provides financial assistance to this endeavour (MHRD). More than 200 curriculum-based video and online courses will be produced as part of this endeavour to promote engineering education in the United States.

e-Gyankosh: A massive open institution, Indira Gandhi National Open University (IGNOU) serves millions of students in India and throughout the world with distance and open education. As well as broadcasting educational content, it provides self-instructional study resources for different programmes. IGNOU has begun work on Gyan Kosh, a national digital repository for educational materials. Open and remote learning (ODL) institutions' digital learning materials will be housed in this repository, indexed, preserved, distributed, and shared. In addition to self-study materials, audio and video programmes, and archives of live interactive radio and television sessions, the repository facilitates the seamless collection and integration of educational resources in various media [16].

The University Grants Commission formed a repository of Learning Objects Consortium for Educational Communication (CEC) as an inter-university centre on electronic media (UGC). The CEC has produced TV shows in English, Hindi, and regional languages in conjunction with its 17 Educational Multimedia Research Centers (EMRCs). In certain cases, the audiovisual programmes are based on school, college, and university-level curriculum themes. Because these materials are so valuable to educators globally, CEC has developed a Learning Object Repository (LOR) and Digital Video Repository (DVR). For students and instructors, the LOR is a library of short-term, reusable learning objects that may be used for face-to-face instruction and worldwide usage. These educational resources may be seen online through streaming video. Subjects, topics, learning item titles, and keywords may be searched for on the LOR portal. Subject categories may also be accessed using this portal.

ePGPathshala (http://epgp.inflibnet.ac.in/about.php) is a website that provides information on ePGPathshala. Funds have been given to the UGC by the MHRD under NME-ICT to produce e-content in 77 postgraduate topics. Technical and administrative coordination is delegated to the INFLIBNET Center by the Standing Committee of Pathshala e-PG Pathshala following its criteria. E-PG Pathshala is an initiative that aims to generate high-quality educational materials in a wide range of academic disciplines, including social sciences, arts, fine arts & humanities, scientific & mathematical sciences, languages, and linguistics.

Indo-German eGurukul on Digital Libraries (http://drtc-isibang-academic-institutes/mmb/) is available. It is a joint effort between the DRTC and the Goethe-Institut in New Delhi to provide self-paced learning on digital libraries. eGurukul on Digital Libraries [17].

II. REVIEW OF LITERATURE

Literature studies are broken down into four domains: digital revolution and change, modern education and learning, digital technology in universities, and the changing nature of university libraries in higher education. The study focuses on modern technical and social computing systems that work hands in hand, such as e-Learning, web metrics ranking, electronic resource planning systems, social media interfaces, and new electronic revolution practices [18].

A. Modern developments of digital education and learning

This revolution in information technology has accelerated the introduction of new educational trends such as digital technologies, the Internet of things, and mobile computing devices such as smart phones and tablets. As a relatively recent facet of academic and educational system curriculum implementation, e-primary learning's goal is to guarantee that higher education and learning can be sustained throughout time.

The practice of e-learning is done by using digital technology and social computing to increase successful pedagogy and teaching techniques. Social computing platforms deliver curricular information teaching and learning methods'-learning uses information communication technology, the Internet, and cloud computing systems to provide education and teaching. Teaching and learning techniques are being greatly influenced by digital technologies, including educational games, simulations, Ipads, Chrome books and other geeky devices like GAFE [19].It is now possible to access a wide range of educational materials, such as canvas educational, iPods in education and skype, YouTube Edu and Google for education, using modern digital education and learning activities [20]. By making education more accessible and giving limitless possibilities for both students and professors, digital technologies have transformed university and library classrooms throughout the country. As a result, professors and students alike may now take advantage of the convenience and accessibility that digital technologies provide. Many different ICT applications and tactics for sharing information and acquiring knowledge are used in e-learning practice, such as video conferencing, mobile computing devices and internet access [21]. Although studies show a widespread dearth of abilities among professionals, lecturers must be educated and competent in using technology and pedagogical factors for the efficient and sustainable growth of e-learning in higher education [21]. One of the most quickly developing teaching fields in education is e-learning, which uses a digital pedagogical technique that differs from the conventional approach, but a key component of success is the lecturer's technological competence. Most Kenya's institutions have not fully embraced digital platforms, putting the country's government's efforts to create and apply e-learning methods at a disadvantage. There is evidence to imply that traditional methods of instruction and curriculum have not altered much over the years, despite the widespread use of technology in lecture halls. Students, faculty, and administrators at higher education institutions have a daunting task in using information and communication technology (ICT) in their classrooms.

B. Modern digital information in university libraries

Higher education institutions, universities, and libraries may all benefit from web metric studies, which have become more common in today's academic world. When it comes to measuring the influence of university websites on the creation and distribution of scholarly research outputs in light of the Internet's fast expansion [22], there is a pressing need to do so. In order to increase the exposure and open access dissemination of scientific discoveries, web metrics ranks international universities based on their web impact factor. Maintaining institutional repositories, promoting open access, raising one's academic and research reputation, and collaborating with colleagues at other institutions and online communities are all part of this process. Using digital repositories, academics and researchers may access information and knowledge about local academic and research material.

Thanks to digital repositories, the University of Nairobi is the top university in Eastern and Central Africa in the worldwide rankings of academic and research institutions [23].

Digital resources, including e-books, e-journals, and social media, have quickly acquired significance in university libraries' information and knowledge management systems. Library systems that are global in scope include information management systems that are massively digitized and the use of upcoming technology and mobile computers. Students, instructors, researchers, and information professionals may all benefit from modern learning resource centres at universities, which provide relevant information sources and technology tools for teaching and learning. One-stop access to information and knowledge is being provided by Kenyan university libraries employing digital technologies such as radio frequency identification technology and electronic resource planning systems. It helps students to make educated judgments and obtain material for research projects by rating repositories [24]. It is the goal of higher education institutions worldwide to disclose repository rankings regularly for the benefit of students, researchers, and anybody else interested in finding out more about where they stand about their competition.

Much attention is paid to rankings of higher education institutions and world-class universities by the general public, as well as by politicians. According to a report, just a few hundred of the world's greatest universities are included in global league tables, excluding thousands of 'normal' institutions engaged in specific training and undertaking basic or applied research.

Current rankings illness has created a need to be rated since, if the institution does not appear in tables, it does not exist. It is suggested in the report that current rankings are unable to accurately diagnose the whole higher education system since so much focus is placed on elite or top research institutions. There is a pressing need for all higher education institutions worldwide to develop international transparency tools that provide useful information on issues such as quality of teaching and learning, access to regional involvement and lifelong learning, regional involvement and cost efficiency [25].

C. Internet of things economy

A digital revolution has resulted in the expansion of big data and cloud computing, the widespread use of mobile devices, creative teaching techniques, wireless gadgets, and an explosion of data through the Internet of things or the Internet of everything. Universities all around the globe have used information and communication technology systems to create learning environments where students may actively participate and receive access to information resources [26]. Cloud and social computing resources provided by enterprise electronic planning systems in higher education institutions have significantly changed the character and role of university libraries and information specialists who manage and interpret business activities and operations in the organization.

Libraries help the development of educational practices, social, cultural, political, economic, and moral values by providing and supporting information and knowledge. Primary goals are to offer high-quality information and knowledge services (both print and electronic) while also creating new methods to assist the academic community of academics, including faculty and students. The advancement of society and the welfare of mankind are two of the primary goals of university libraries.

ICT has made it possible for higher education institutions to become stewards of intellectual and capital assets. Students' motivation, access to information, and sharing of resources are all enhanced by the use of ICT in learning at universities, as is the ability for students to think creatively and communicate their ideas effectively [27]. Content management and dissemination of information systems allow university libraries to manage and maintain knowledge assets in digital or electronic forms'-content and e-resources, including e-books, e-journals, and online databases, have the potential to improve the quality of teaching, learning, and research output. As the traditional repository and source of knowledge, libraries must become more actively involved in publishing practices to meet the demand for the ever-increasing volume of content produced by educational institutions.

III. CONCLUSION

By digitizing and offering free access to Indian libraries' collection of century-old publications as well as rare papers, theses and dissertations, and journals, India has become an active participant in the digitization and open access movement of the digital library movement. As part of an effort to develop a genuinely digital library, the Digital Library of India has been launched. Digital archives like ShodhGanga, which are administered by the Indian government, make it easier to access and archive Indian doctorate theses, but they also improve the quality and level of research. Various organizations, including the apex higher education bodies, are also working to build open courseware and cross-archive search services. Developing nations have looked to India for leadership in the digital library revolution. Contemporary teaching environment implies that academic institutions should provide adequate information structure to enable access to education, learning, experience and data resources through digital technologies, online store applications, digital repositories, mobile computer smartphones and social media technologies (Facebook, Twitter and YouTube) (Facebook, Twitter and YouTube).Technology resources and facilities such as social cloud

computing and the Internet must be used to increase the digital environment's ability to deliver e-learning and e-research. Among the millennium and new generation of youngsters, or digital natives, mobile computer apps and social media technologies are gaining in popularity. We must pay attention to the expansion and importance of digital platforms that have been utilized effectively in branding corporate enterprises as well as for political and social mobilization efforts. There are no educational resources available outside of the conventional boundaries of organizations because of this technology's widespread use. The majority of students in higher education are Millennium and new generation "digital natives" (young people and adults who rely on digital platforms for access to education and information).

It is imperative that higher education institutions and information management companies provide goods and services that meet the interests and desires of this customer base.

Higher education and information management companies are part of a wider teaching, learning, and knowledge-sharing ecosystem that includes the digital environment and the Internet of things economy..

Higher education and information organizations' business models are being transformed by digital technology, which is pushing the limits of existing roles and responsibilities.

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