# Information Communication Technology and E-Resources and Services in Academic Libraries

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## Abstract

This paper attempts to study how **Information** and **communications technology** have changed the **academic library** in a profound way enabled by computers and networked **electronic resources**. Information Communication Technology (ICT) has remained a catalyst in the issue of national advancement and development. Information, as power is effectively an infinite resource and a vital tool needed for the development of all sectors in any nation. It is therefore, imperative that application in libraries would go a long way in satisfying the information need of the citizens. It is worthy of note, that the emergence of ICT has impacted greatly on the quality of information provided through libraries. It also enables proper and adequate provision of library services to library users from all disciplines. In this 21st century, the drastic role of ICT in library operations cannot be over emphasized. Many library routines and operations that were initially performed manually are now being converted to computerized operations which means, applications of ICT techniques to providing better and faster services to the end users.

A nation without functional libraries and information centres may lack access to information that would enable her sustainable development. In this era of globalization, in which the world is connected, information gains its power through permanent storage and wide distribution, which could be achieved through ICT. Apparently, ICTs are indispensable tools needed for provision of value added information that support the sustainable development. Although, many institutions and organizations including libraries face diverse challenges in the process of integrating ICTs to their services.   To develop and implement a successful electronic library resource system, it is vital to review the success factors and identify the most important technological aspects of Digital Libraries (DL) resources. Electronic library information technology was described and grouped into several categories that influence user satisfaction in a DL context. These are open access to information, the facility of access, uncomplicated interface design, high quality of the communication process, Internet performance, performance assurance service, ease of communication via social network, and patron-driven acquisition. With these important features of DL services, the simplicity of accessing online information and the performance of DL utilities have become of paramount importance.

Several research works were therefore reviewed and evaluated to determine the usability of DL services; thereafter, the design of the DL discovery system was developed through Blacklight open-source software.

*Key words:   Information Communication Technology , E-Resources , Digital Library, Academic Libraries*

## Introduction

The network is of great importance to libraries to tackle today's burning issues, such as knowledge overload, user diversity, and financial crunch, whereby digital service subscription depends on consortia broader access to digital services at a consequently lower cost . The term electronic library resources define the information processed and digitally driven using hardware and software that offer information that can be accessed by digital electronic users through remote information provider networks or mounted locally by digital library (DL) managers. In reality, it transfers the citadel of historically getting information to a personalized, adaptable, and synergistic culture based on information, communication, and technology (ICT) . Digital libraries are mainly designed to solve specific library problems. The online collection includes DL e-books, e-newsletters, e-references, theses, and dissertations . The factors affecting user satisfaction in a DL context can be categorized as ease of access, few download exceptions, and limitations, simplicity of the DL interface design, quality of interaction process, Internet performance, quality assurance service, and ease in communication provided for by a social network .

Libraries worldwide are quickly transforming due to the ongoing growth and application of ICT . It is important to note that while the barriers to accessing DL resources may be similar in different universities, there are more in developing countries than in developed ones. The notable obstacles in literature are poor information and digital literacy skills, students' negative attitudes towards electronic tools, poor Internet connectivity, poor ICT infrastructure, information overload, vast amounts of irrelevant information, licensing limitations on access to the DL collection, lack of generic e-resource portal interfaces, preference for print assets over electronic resources, discouraging e-resource use by academic staff, user authentication, download delay, lack of comprehensive ICT and searching skills among library staff, high cost of affordable online access, and low organizational budget for library departments .

Most library users prefer popular web search engines to library-driven systems; consequently, most library services continue to be underused. Librarians, therefore, need to adjust what they learn, how they function, and their effectiveness . Nonetheless, the absence of training for staff and other library users is a limiting factor in the accessibility and use of e-resources as users face difficulties in assessing services and the staff may lack adequate expertise to assist the users . Among the e-library manager's obstacles is that the development of a DL requires substantial investment in capital, technology, and manpower to satisfy users. Therefore, library culture has a history of resource sharing due to budget constraints that most libraries face. A library organization embraces a common goal of resource sharing and cooperation, commonly referred to as a consortium. This study is an attempt to assess the awareness, utilization, and development of electronic resources in the library by the academic community of universities. Therefore, this paper represents a critical review of DL resources taking into account the practical aspects of library services. The paper defines the criteria used in creating a DL for the university-level research community. Hence, this paper aims to review and evaluate some research works and thus determine the usability of DL services and develop a user-friendly DL discovery system to mitigate these learners' technical hitches. Therefore, this paper reviews DL resources in the area of usability, DL development as well as ease of accessibility, and finally developed DL discovery systems.

**Objective:**

This paper intends to explore and analyze **Information Communication Technology** (**ICT**) in management and provision of **library services** with networked **information** such as database, **electronic** scholarly **journals** and other.

**Information Communication Technology in academic libraries**

The quality of service (QoS) has become crucial in assessing the efficacy of service delivery. Diverse models and structures have been suggested to analyze the QoS in systems . Nevertheless, the prevalent concentration of work in QoS for the DL is about the extent of the user experience perspective. Ahmad and Abawajy addressed different dimensions that are from the perspective of digital service providers. The model shows that the level of QoS provided by digital service providers directly affects the perception and satisfaction of end-users.

The other hypothesis of the design of electronic libraries was suggested by DeLone and McLean to investigate how the reliability of the process and data provided affected the satisfaction of users. Wixom and Todd also established that information and device reliability, perceived utility, ease of

use, and application behavior of data storage systems affect user satisfaction. Moreover, the work by Zhang indicates that the system and quality of information are key determinants of the happiness and sense of community of social networking users. Tu and Hwang addressed the role of sensing technologies and learning strategies in library-associated mobile learning. The study aimed at investigating issues like the type of sensing or location-based technologies and learning strategies employed in library-supported mobile learning. The results showed that advancement and popularity of mobile, wireless network, and sensing technologies have further provided a more convenient and effective environment for accessing library facilities and resources.

A study conducted at the University of Houston Libraries by Guajardo et al. conveyed the evolution of discovery systems in academic libraries. The authors concluded that, for several years, libraries have adopted discovery systems to provide search experiences that reflect user expectations and improve access to e-resources. The University of Houston Libraries has kept pace with this evolving trend by pursuing other discovery options which include an open-source tool, a federated search product, and a two-index-based discovery system. The important criteria for assessing discovery systems and valuable lessons that may be applied in future system-evaluation processes and implementations should be identified in pursuit of better options for users and improved access to e-resources. A recent study by Oh and Colón-Aguirre on the perceptions for use of Google Scholar and academic library discovery systems reveals that the perceived comprehensiveness, subjective norm, loyalty, and intended use of academic library discovery systems are higher than Google scholar, while at the same time, the perceived ease of use, satisfaction, and system quality of Google Scholar were higher than those of academic library discovery systems, implying that users' satisfaction with the DL is the key indicator for the quality of DL services.

**The Satisfaction of Users with Digital Library Systems**

User satisfaction assessment and preservation is an essential part of library quality management. Within the DL background, satisfaction refers to "feeling happy with the DL in helping to complete a task" . Consumers' DL satisfaction is closely linked to their experience with DL services. Identifying the typical standards of DL providers requires (i) comprehensiveness, including everything; (ii) accessibility, everything available immediately; (iii) instant-gratification, response speed; (iv) software capacity, seamless; (v) user-friendliness, single interface; and (vi) various formats, wording, images, and audio . On the other hand, when assessing DL, user satisfaction focusing on the interface and functionality offered by the DL is very important .

**Information Quality**

Several academicians and researchers have recognized the importance of data reliability as a key component in the analysis of an effective computer-based data system. Information quality is essential in DL's point of view to support information needs. As a result, its attributes are usually associated with consistency, design, timeliness, currency, reliability, completeness, accuracy, and significance . Therefore, the quality of information significantly affects the satisfaction of DL users.

**System Quality**

System quality affects the perception of users of the performance of a DL in knowledge assortment and delivery . In the development of information systems, the quality cycle of the systems is a strong determinant for user satisfaction in various contexts. Accessibility, accuracy, reliability, and quality are the key attributes of DLs performance measurement systems  . Quality, accessibility, and consistency ensure the DL requires remote access to the infrastructure to access information wherever and whenever. This also ensures that the DL is accurate and functionally usable over time. When using the DL to search for information, effectiveness is associated with the quality, accuracy, and completeness of users. Considering the findings of Masrek and Gaskin , the quality performance of the DL's software dramatically affects satisfaction; hence, Figure is formulated to show that the quality of the system predicts users' satisfaction with the DL significantly.

**Service Quality**

User perception of the performance of a DL in the processing and distribution of information is characterized by service quality. As with information quality and applications, earlier studies show strong support for the contribution of the QoS to user satisfaction with DL. Different service quality models have been developed by scholars to test the DL. For example, DigiQUAL's   and LibEval designs are available. Other authors investigated DL service quality attributes or measurements in addition to these models . One of the prominent qualities of digital service performance is accession, reliability, accessibility, and responsiveness. Digital library's service quality factor is very important as there is no face-to-face interaction in digital communication. For an open, healthy, sensitive, and well-integrated DL, there should be a favorable user satisfaction score and it can be concluded that the QoS and reliability have a big impact on user satisfaction with DL.

**Perceived Usefulness**

Perceived usefulness is described as the degree to which a person perceives that using DL improves academic performance . Some authors have adapted products used by researchers to measure the perceived value by operationalizing the individual net benefit of DL services and incorporating information system success model (ISSM) into the Technology Acceptance Model (TAM) Several studies have shown that perceived usefulness influences the acceptance of DLs by users . Other studies have however shown that the perceived value is a strong indicator of satisfaction . Users of DL need information and are searching for it. However, their satisfaction levels can be lowered if their experience of using DL-provided knowledge is not useful or beneficial.

**Perceived Ease of Use**

The perceived ease of use is defined as "the degree to which an individual believes that it would be effortless to use a particular system" . In this context, user-friendliness indicates a belief that using DL would require minimal effort. Literature also indicates that accessibility is sometimes related to ease of use . Where it is difficult to access a DL, users tend to consider it difficult to use and on the other hand, users are more likely to see it as user-friendly when it is readily available . Other library researchers found that online public access catalog (OPAC) satisfaction was related to ease of use . Based on these findings, the perceived ease of use is thought to have a positive effect on satisfaction. To this end, it is assumed that user-friendliness significantly increases user satisfaction with the DL.

**Cognitive Absorption**

The concept of cognitive absorption denotes the deep involvement or holistic interaction with the DL of a person. This concept was first introduced into the information system (IS) studies, to help users evaluate such systems. The first concept incorporated the facility of use as one of the building's dimensions . Nevertheless, mental retention was used in the modified and improved model as determinants of user-friendliness . No one has ever tried to examine the effect of cognitive focus in the sense of DL on satisfaction. Since the DL is a subset of computer-based ISs, its functionality is somewhat close to other forms of IS such as e-learning. Therefore, results on the effect of cognitive integration on the satisfaction of users from previous research should also be important for DLs. With this rationale, the cognitive absorption greatly increases user satisfaction with DL.

**Patron Driven Acquisition**

The satisfaction of users with digital libraries from the above-mentioned variables is patron-driven acquisition (PDA) or demand-driven acquisition (DDA) and is a library development model in which libraries purchase materials only if it is clear that a patron requires it. Libraries provide DL users with access to search engines, educational resources, and/or library catalogs in an appropriate manner from which the client can request items. When certain thresholds such as the number of pages read or several requests are reached for an item, a library purchases the item and provides instant access to patrons . The library may obtain the resource indefinitely, or acquire a license to use the resource only at certain times or in some way. Since the material purchased is in digital format, "PDA emphasizes collecting for and at the time of need" rather than gathering long-term focus . The patron-driven acquisition is often associated with e-book sets, although there are also choices for print and hybrid PDA . Focusing this approach on the use of digital content PDA has several advantages. For instance, distribution is instantaneous; e-books do not need any physical space to manage, improving the capacity of the collection; and purchases are assured, which is an important consideration when purchasing materials . Furthermore, security is integrated into the system to avoid the decimation of library budgets by library staff without intervention. However, users can print only a few pages at once, certain publishers do not write book pages, and e-books can be "checked-out" for a certain time. Many patrons are not allowed to access a title until it is "checked-in." At the same time, patrons may not want certain books from their publishers or third-party vendors to sell any specific titles in electronic format and many vendors do not allow e-book downloads . Others do not allow individual chapters or entire e-books to be downloaded.

Comparing shopping among e-book vendors is not easy unless a library deals with more than one vendor. It may be difficult for software subscribers to view e-books to please users, library budgets may be inconsistent year after year, e-books may be more expensive than printed books, and retailers prefer to charge extra for digital versions of books. Project counter statistics vary from seller to seller; thus, statistics are important for evaluating the use and reasoning of e-book maintenance, including the reliability of specific counter statistics and DL Resource Administrators' access capabilities, and are challenged to take notes or annotate e-book text between sellers, faculty, and students. This is the main complaint of students concerning their experience in one- or multi-seat licenses of e-books and e-book titles . Libraries do not deal with online book theft when dealing with PDA; they are concerned about broken Internet links that lead users to e-books. Nevertheless, once publishers are aware of this problem, they can easily fix them. Libraries can accommodate on- and off-campus use of e-books, making them accessible anywhere. E-book PDA is a new tool for integrating library practices, and e-books provide libraries and consumers with unique advantages in some cases, such

as saving storage and being immediately available . Table 1 summarizes the essential variables related to DL adoption and usage.

**Technological Design Aspects of Digital Library Resources**

Technological aspects of designing DL resources concentrate on the following elements: ease of access, interface design, communication level, device reliability, and QoS . Digital library resources variables are identified as the technical tools required for developing a DL for the research community and digital services based on the theoretical model, updated documents, and DL initiatives around the world .

**Digital Library Resources**

This is the digitization of all records in the DL collection. While journals already held by the library with a digital subscription are not considered to be part of this collection, the references are provided to the reported catalog. The digitization of documents created by the library and information studies of the research community is preferred since the goal is to integrate some of the features of the semantics DL; a room is given for sharing and collaboration in the writing of user-generated content. DL resources involve researchers' works as well as online records including monographs, educational event promotional posters, online images, workshops, symposia, or colloquia

**Conclusion**

The application of ICT has drastically transformed the way of collection, storage, and retrieval of information in libraries. Particularly, the internet has completely transformed the traditional libraries into digital libraries. "Using the internet information may be accessed from anywhere of the universe. The arrival and proliferation of electronic resources and digital libraries have already influenced the way users use print resources and traditional libraries. It has also sparked a new wave of literature on the perception and preference of print and electronic resources". The digital age has a tremendous change in the way of information is stored and accessed. "Many new terms viz., „digital libraries", „libraries without walls", „virtual libraries" are emerging to describe the libraries of present-day age. A digital library is popularly viewed as an electronic version of library where storage is in digital form, allowing direct communication to obtain material and copyright it from a master version"

As the world is growing technologically, library operations in various locations in the world are no longer how they use to be. Libraries in India since the beginning of the 21st century have started

making efforts to metamorphose from being institutions driven by manual processes into modern ones where operations are in part or wholly dependent on ICT applications.

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