



*The digital library's contribution to the knowledge economy
through the free availability of digital information.*

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Abstract

Through this research, we aim to introduce digital libraries and their role in the knowledge economy by achieving the free availability of digital information, as digital libraries still maintain their importance and place in the system of digital preservation and free access to digital scientific information despite the developments witnessed by the information sector, where they play a fundamental role in Establishing and developing the knowledge economy.

We have studied this topic using the descriptive approach by extrapolating studies on the topic, and we have identified the nature of the digital library, its sources and services, especially the service of making digital scientific information available. We technologies, innovation and digitization. Achieving free access to digital scientific information in its various forms.

✓ Keyword. Keyword. Digital library. Open access. Digital scientific information. Services. knowledge economy.

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1. INTRODUCTION

Technological development has contributed to digital and electronic transformations in all sectors, With the emergence and expansion of the new digital environment, many concepts emerged, such as e-government, e-commerce, and the e-university, The information and library sector was not isolated from these developments, as it took the largest share, whether at the level of concepts or applications.

As the computer was introduced to library services in the sixties, and automated systems came to run library services in the eighties, and today we live in the era of digital libraries and modern information systems that represent the most advanced developments in the field of libraries and documents, The importance of the presence of this type of libraries lies in facing the challenges of the modern information and communication revolution in the world, and the increase and diversity of the needs of researchers and scholars and their desire to obtain modern and accurate information in quick ways, as opposed to the inability of traditional information systems to meet them. In addition, it does not occupy a large spatial area, and consists only of modern technologies, including devices and connectivity equipment, to connect the beneficiary to digital information sources. And with these characteristics and features, this type of library has saved researchers the trouble of moving around and searching for information, so they can obtain it at any time and from anywhere, saving effort and time.

In view of all these positive aspects that characterize digital libraries, the processes of establishing, maintaining and developing them have become a focus of interest for those in charge of libraries in the world. In fact, the matter went further than that and the Digital Libraries Federation was established in 1997 in the United States of America. Who took upon himself the task of developing strategies and administrative systems and encouraging scientific research to develop digital libraries, as well as the emergence of many specialized scientific journals that were interested in following up and publishing all developments related to digital libraries in the world, such as Dlib Magazine, Electronic Library Journal, The countries of the developed world have witnessed the widespread establishment of digital transformation projects in libraries and archives alike, and less so in the Arab world, so that an unlimited number of digital and virtual libraries have spread throughout the digital environment.

Since the goal behind establishing digital libraries is to achieve permanent availability and free

access to information, the International Federation of Library Associations and Information Institutions (IFLA) recognizes within the United Nations Sustainable Development Plan 2030 that increasing the availability of information and knowledge in society and the presence of information and communication technology It supports the achievement of sustainable development and develops people's lives, and the circulation of information and the right of everyone to access it has been recognized in the Sustainable Development Goals as one of the goals of the sixteenth goal”

In light of the change in the global economy to an economy that is more dependent on intellectual capital and skills, and less focused on the production process, and with the emergence of the new economy based on knowledge production, processing and exchange, knowledge has become the primary driver of all areas of development and an important source for the national economy. Digital libraries have become one of the basic pillars of the knowledge economy by making digital information available in light of the rapid digital economic transformations. Especially with the great demand for digital information in its various forms, which exist at the level of databases, digital platforms, and various modern information systems, Accordingly, we decided in this research to address the issue of the digital library and its role in the knowledge economy by achieving free access to information, highlighting the additions made by the digital library in this field, similar to other modern information systems, and the nature of the challenges that hinder its work, especially with modern developments.

2. Methodological section

2.1. Study problem

Digital libraries are considered one of the most important modern technologies in the information sector, and have received great attention from specialists due to their great role in making digital information available, especially with the major digital transformations in all sectors and fields, and in light of the new trends related to the knowledge economy, the digital library makes important contributions to this. Economy, As the responsibilities on digital libraries have increased with regard to providing resources and achieving permanent availability in light of the changing practices of searching for information in the modern digital environment and the strong demand for digital information and the precise knowledge needs in the knowledge economy, and therefore we raise the following problem:

What are the contributions of digital libraries in providing digital information and achieving free access to it in light of the knowledge economy?

From this, we pose the following sub-questions:

- What are digital libraries and what are their most prominent characteristics?
- What is the nature of the information sources available through digital libraries?
- How do digital libraries contribute by achieving free access to information in the knowledge economy?
- What are the challenges facing digital libraries in developing the knowledge economy?

2.2. Objectives of the study

Through this study, we seek to:

- Defining the nature of a digital library and monitoring different trends towards its concept.
- Identifying the characteristics and features of the digital library related to producing, storing and retrieving information.
- Highlighting the advantages of digital libraries and their role in providing and making digital information available in its various forms.
- Explaining the digital library's contribution to the knowledge economy.
- Identifying the challenges facing the work of digital libraries in the knowledge economy.

2.3. scientific method

In this study, we relied on the descriptive approach in order to suit the nature of the study, by collecting information from sources about digital libraries, in order to introduce this modern type of information systems, determine its role in achieving the free availability of information and knowledge in the modern digital electronic environment, and describe its roles in The modern knowledge economy is based on investment in information and knowledge.

2.4. Terminology of study

2.4.1. Digital system

A digital system is a system that encodes, processes and transmits data in an intermittent and rapid form (André, 2002, p. 45). The digital system is also defined as “a system that encodes information in a binary system, which includes zero and one, as it divides the signals into purely abstract steps in the face of wave-like analog signals, and in the communication range digital is referred to as the discrete binary state, which puts the computer outputs in a state of either Closed or open, modems convert digital signals into an analog wave, for transmission over traditional telephone lines.

In another definition, Binary code is a system by which numbers, letters and other information are represented using only two symbols, or binary digits. The binary definition to a computer is a 1 and 0 code arranged in ways that the computer can read, understand, and act upon. (Mekhitarian Jackson, 2023)

Through the previous definitions, we conclude that the digital system is a system that encodes information in binary form, where the information takes the value of zero or one, and is characterized by speed and accuracy.

Features of Digital Systems:

- Uses binary code: Digital systems use binary code, which is a combination of zeros and ones, to represent information.
- Accuracy: Digital systems are more accurate than analog systems because the information is represented in a precise and consistent manner.
- Processing speed: Digital systems are capable of processing large amounts of data quickly and accurately.
- Noise immunity: Digital systems are immune to noise and interference, which means that the transmitted information is less likely to be corrupte. (GeeksforGeeks, Difference Between Digital And Analog System, 2022)

2.4.2. digitization

Digitization is one of the most powerful major qualitative transformations that the information sector has known for more than two decades. Through it, new methods have been developed to preserve information and make it available, It represents a radical change for information systems.

Digitization is defined as a sophisticated reproduction process that enables the conversion of a document of any kind and container into a digital format. This technical work is accompanied by intellectual and office work to organize the post-information, in order to index, schedule and represent the content of the digitized text. (Hanna, 2022)

Digitization is the process of converting information into a digital (that is, computer-readable) form. A result is a representation of an object, image, sound, document, or signal (usually an analog signal) obtained by generating a sequence of numbers representing a discrete set of points or samples. The result is called a digital representation, more specifically a digital image for an object or a digital form for a signal. In modern practice, digitized data is in binary form, making it easier for digital computers to process and otherwise manipulate it. (Encyclopedia, Science News & ; Research Reviews, 2023)

Paper documents are digitized by photocopying, where the page to be photographed is placed on the scanner, to be photographed and converted into a series of binary codes that are sent to the computer linked to this scanner, which saves the information coming to it at the level of the hard disk, (Guide de gestion d'un projet de numérisation, 2014)

From the above, we conclude that digitization is the process by which data is converted into a digital form, for processing by a computer, whether this data is printed text, images, or sounds, by using appropriate digitization devices such as optical scanners.

2.4.3. Digital information

means a digital record that is perceived with the assistance of a computer as a text, spreadsheet, image, sound, or other intelligible thing and it includes metadata associated with the record and a record produced by a computer processing data. (Law Insider, Electronic information Definition|, 2021), and digital information is generally comprises data that is created by, or prepared for, electronic systems and devices such as computers, screens, communication devies and so on, and can be stored on those devices or in the Cloud. The beginning of the 21st century saw electronic digital become the most popular method of storing, reading, copying, editing and moving data. (Digital information, 2022)

digital information is of two types: (Badr, 2004).

- Information of digital origin
- Information transferred to the digital system

3. Digital library and Free access

There are many modern vocabulary and terms mentioned in the writings and studies of specialists in the field of libraries and information, which refer to libraries that are characterized by the extensive use of information and communication technologies and computing work, and the use of advanced systems in storing, retrieving and transmitting information to researchers. The most important of these terms is the electronic library, Virtual library, and digital library.

By scanning some studies and intellectual works on this topic, we found that these terms are used interchangeably and synonymously to denote the same concept, which casts some ambiguity on the concept of the digital library that is the subject of the study. We will try to clarify the connotations and meanings of these terms, to remove ambiguity and confusion and avoid confusion between them, from In order to reach an accurate definition of the digital library.

3.1. Electronic library

According to Tennant, it is “a library that includes electronic materials and services, while electronic materials include all digital materials in addition to various electronic signals (Analog format), which require an electrical current for use, such as video tapes, and they are originally electronic signals that require an electronic device to be visible, and accordingly The electronic library consists of the materials found in the digital library in addition to other sources. It is more comprehensive, but it has declined and is less used in library literature.”(AHMED HAFAD, 2001, p.282)

As for Abd al-Latif Sofi, he defines it as “the library that is created, processed, and verified through a computer system, using a combination of microelectronic equipment, and it includes traditional sources in addition to electronic ones.” (SOUFI, 2003, p.127)

When researching the origins of the term, some specialists confirm that the term electronic library is the oldest term to appear, to include all efforts to computerize library operations using electronic devices, such as computers, and the phrase “electronic” refers to how the devices work,

rather than a description of the data they contain.

From the above, we conclude that the electronic library may be part of a traditional library that contains electronic information sources, regardless of their encoding system (analog or digital), in addition to automated printed sources.

3.2. Virtual library

To adjust the concept of the virtual library, it is necessary to define the basis on which it is based, which is virtual reality. Virtual reality is one of the concepts that information technology has added to our contemporary lives, and it can be viewed as a computer-based multimedia environment with high effectiveness. Virtuality does not conflict with the truth, the virtual is what exists as a capacity and not as an action.

Virtual reality is characterized by a set of characteristics: (What is Virtual Reality ? Its Key Characteristics, Types, and Applications, 2020)

- Simulation: This reality is based on a world that simulates real experience in an artificial environment.
- Immersion means that users become immersed in the virtual world and feel as if they are in a real world.
- Interaction refers to the interaction that exists between users and those things that exist in the virtual world.

The virtual library is not just a digital or electronic library that enables the reader to obtain documents without leaving his home or office, but rather it is a set of rules located at different points, accessed through a single interface, as if all its contents were collected in one central library. As for Hubert Fondin, he says that it is “ building that allows direct access to every type of digitized collections and documents or their electronic images, and its basic characteristics are that it is a library without a wall, and its location cannot be determined, as it has no specific place and it does not exist by itself, but rather is possible.” (FONDIN, 2001,p.226)

This is what gave it the character of virtuality, and it is present everywhere because it is on information networks, and it is not located in a place to exclude the construction element, and it is only on computer screens connected to the World Wide Web.

3.3. Digital library

The term digital library is considered the most widespread and widely used compared to previous terms referring to modern libraries. The concept of digital libraries has received the attention of many specialists in libraries and information, and many professional and scientific institutions, dictionaries, specialized knowledge circles, and the research and writings of specialists have paid attention to it. In this presentation, we will try to review the most prominent The most accurate definitions provided for the digital library.

The Digital Library Federation defines digital libraries as: Organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily available for use by a defined community or set of communities. (Mayank Trivedi. 2010)

Defined by the Council for Library and Information Resources (CLIR) “Digital libraries are institutions that provide information resources that include specialized frameworks for selecting, processing, distributing, and preserving digital collections, ensuring their continuity and flow, and providing them in an easy and economical way to an audience of beneficiaries.” (CLIR Issues Number 4, 2018)

In a definition issued by the International Library and Information Association (IFLA), a digital library is “a group of organized services and content that allow the beneficiary to access digital information via electronic computer networks.” (IFLA world library and information congress, 2019)

It has also been defined as “the library that consists of electronic and digital resources and does not need a building, but rather a group of servers, and a network connecting it to the terminals for use. The digital library represents the advanced face of the electronic library, in terms of its treatment of information as numbers to facilitate its storage and transmission in information and communications technologies.” Investing and trading it electronically, in digital forms with a high degree of accuracy and use across various countries of the world.” (mahmoud makawi, 2004)

A digital library, also called an online library, an internet library, a digital repository, a library without walls, or a digital collection is an online database of digital objects that can include text, still images, audio, video, digital documents, or other digital media formats or a library accessible through the internet. Objects can consist of digitized content like print or photographs, as well as originally

produced digital content like word processor files or social media posts. In addition to storing content, digital libraries provide means for organizing, searching, and retrieving the content contained in the collection. (Witten et al., 2009, p. 50)

Through the previous definitions, we conclude with a set of features that are specific to the digital library, namely:

- Everything in the digital library should be in digital form.
- Advanced systems and techniques are used in search, retrieval and availability.
- Providing its services through information networks.

Through the above information and definitions, we can formulate the following definition of the digital library, which is the library that aims to create digital assets, whether produced in digital form, or that have been converted to digital form (digitized), and the process of processing and adjusting bibliography using an automated system is made available Access to it and benefit from its various services through a computer network, whether local, extended or via the Internet.

Adjust the relationship between terms

By defining the three terms, we conclude that the electronic library refers to the mechanism of information delivery, as it reflects a mechanism for dealing with information that relies on electronic devices instead of the traditional one. purely stored and made available through electronic devices through the digital system, while the term virtual library reflects the virtual environment through which the library is exploited, and the beneficiary deals with digital resources, and therefore it means the use of the library in non-physical presence, and despite these differences, the three libraries share a basic characteristic is its reliance on electronic operation.

3.4. Characteristics of the digital library

The digital library is a new phenomenon in the world of information technologies, as it came as a result of the integration of communication technology, computer technology, and the associated software industry and information storage techniques in the field of libraries. In general, the digital library is characterized by a set of characteristics, including:

❖ *Digital formats of information*

Digital libraries collect information sources represented in a group of digital works, where information is stored in the digital system, and these sources are either printed sources that have been converted into digital form, or sources produced digitally in the original. (Candela and al., 2011, p. 120)

❖ *Organizing content*

Digital resources organize an intellectual organization to describe informational entities, by relying on data descriptors (metadata), classification, automatic indexing, attribution control, and extraction, and this makes it easier for the beneficiary to access the required sources with the least effort and the fastest time.

❖ *Sharing resources.*

Digital libraries adopt the concept of sharing resources, which opens up areas of cooperation and sharing between many documentary systems, and The possibility of using the information source by a number of beneficiaries at the same time.

3.5. Digital information sources

Digital information sources are the most prominent products of technology, and they are the media used by digital library systems in providing and making scientific information available in digital form. There are many terms that refer to them, such as digital sources, multimedia, and finally digital sources of information, which is the famous term that is currently in circulation according to its most important characteristic, which is the style. Creating and reading information. Marilyn Deegan defined digital sources as “a series of electronic impulses represented by a group of bits, which depend for their display and processing on computers and can be communicated over networks.” (AISSA SALAH, 2006, 172)

3.6. Building and developing digital resources

Digital collections or resources are those digital materials that have been selected and organized scientifically in order to facilitate access and use. The sources in the digital library are represented in:

- Digitized resources and are provided through digitization operations that take place at the library level.

- Originally digital sources (laser discs, online information, databases).

Among the most important methods used in the development of digitally created resources, we mention the following:

- Through acquisition, whereby the library acquires these resources from publishers and suppliers.
- By subscribing to external resources and making them available by the library without owning them.

The digital library should draw up a policy for the development of its digital resources that allows it to achieve free access later, based on defining the bases for selecting digital sources to serve the nature and needs of the library. The most important bases that should be taken into consideration are:

- Content:

It is the basis that relates to scientific content, comprehensiveness, accuracy, modernity, and the status of the author and publisher.

- License and Terms of Use

Digital information resource suppliers impose licensing agreements in order to protect their products and control their proper use, and the digital library provider must take into account these agreements because they may include legal obligations and liability that may fall on the library if these conditions are violated.

- Cost:

As there are several alternatives to the library in terms of pricing policies for digital resources, as follows:

- Individual and cooperative purchasing: The most important characteristic of cooperative purchasing is the discount and reduction in price resulting from the library's participation with a number of other libraries in purchasing the digital resource.

- Package subscription: This is one of the new methods that publishers and suppliers have begun to implement, in which a group of electronic periodicals, electronic books, or databases are collected together, according to the subject, and made available for a special fee, while it is not allowed to subscribe to the group's materials individually, with the aim of promoting sources that are in low demand. In this case, the information specialist must carefully evaluate the advantages of the integrated group in terms of price and value.

From the above, we say that any digital library project must adopt a collections development policy, because digital library collections are not limited to digitized printed sources only, but extend beyond them to ready-made digital sources. Therefore, the library must adjust its policy to serve its specialization and needs, using this Supply committees and specialists

3.7 Free access via digital library services

Digital library services have revolutionized the way we access and use information in the digital age. These services include a wide range of products to meet the different needs of users and provide convenient and comprehensive access to digital resources. These services include online catalogs for easy search and retrieval of books and other materials, electronic versions of books and journals (e-books and e-journals), extensive databases on a variety of subjects, multimedia collections, digital archives and institutional repositories. In addition, the digital library provides interlibrary loan services, reference assistance, digitization projects, mobile applications, and responsive websites to meet the needs of modern users. (Library & Information Science Education Network, 2021)

3.7.1. Online Public Access Catalog (OPAC)

The Online Public Access Catalog (OPAC) is a digital library service that serves as an electronic version of the traditional library card catalog. It is an easy-to-use online database that allows library users to search, search, and access library collections such as books, periodicals, multimedia articles, and other resources. OPAC provides a powerful search interface that allows users to search for articles based on various criteria such as author, title, subject, keywords, and publication date.

3.7.2. Databases and Search Engines

Databases and search engines play a central role as digital library services, revolutionizing how information is organized and accessed. A database is a curated collection of various resources such as

articles, reports, images, and multimedia, often categorized by topic or type. They provide a wealth of information from a variety of sources and provide users with a centralized knowledge base.

3.7.3. E-Books and E-Journals

E-Books and E-Journals have become indispensable digital library services, offering convenient access to a vast array of literary and scholarly works. E-Books provide users with the flexibility to read books on various digital devices, with features like adjustable font sizes, search functions, and bookmarking. (Library & Information Science Education Network, 2021)

3.7.4. Online Reference Services

Online Reference Services is an essential digital library service that provides users with virtual support and expert guidance from librarians and information professionals. These services allow users to find answers to questions, obtain research assistance, and receive assistance with various information needs through Internet-based communication channels. Online reference services typically include live chat, email, or web form submission, allowing users to interact with librarians in real time and receive answers within a reasonable time frame. With their extensive knowledge and access to a variety of information resources, librarians can provide patrons with accurate and reliable information to support research, scholarly activities, and general inquiries. (Nazim & Saraf, 2005)

4. Knowledge economy

4.1 Definition of knowledge economy

Although there is no unified definition of the concept of knowledge economy, it can be said that human culture has relied heavily on knowledge throughout history to survive and improve living standards.

Knowledge economy is the economy that is based on information from A to Z, meaning that information is the only element in the production process, information is the only product in this economy, and information and its technologies are what shape or determine production methods and marketing opportunities and fields. (Mohamed, M. M. A., Liu, P., & Nie, G. 2022).

The knowledge economy is a system of consumption and production that is based on intellectual capital. In particular, it refers to the ability to capitalize on scientific discoveries and applied research.

The World Bank defines knowledge economies according to four pillars: (The World Bank,2006, P 5-8)

- Institutional structures that provide incentives for entrepreneurship and the use of knowledge.
- Availability of skilled labor and a good education system.
- Access to information and communication technology (ICT) infrastructures.
- A vibrant innovation landscape that includes academia, the private sector, and civil society.

4.2 Characteristics of the knowledge economy

4.2.1 The ultimate role of innovation and scientific research

Every institution within the framework of the knowledge economy should To work and cooperate with research institutions and academic institutions and benefit from the outcomes of scientific research and patents for the purpose of serving society. (EUROPEAN COMMISSION, 2007)

4.2.2 continuing education and training

Continuing education for individuals and organizations helps increase production, so it is necessary Governments provide all means to stimulate human skills and help them learn and hone lifelong their creative skill to suit the needs of the market and society in general and introduce new technologies in learning and educational curricula to keep pace with the new economy.

4.2.3 ICT

Is the main catalyst for growth The new knowledge economy is characterized by its adoption, it relies entirely on modern technology in production and distribution, which is considered the infrastructure for information technology communications are an important factor in entering the knowledge economy such as digital library.

4.2.4 Knowledge is a commodity

Knowledge in this new economy is the basic raw material, as it has a characteristic Permanence and increases with use and spread. In this context, only secrets protection processes must be provided commercial rights, copyrights, trademarks, and patents for a specific period of time.

4.2.5 The workforce possesses the skills

To adapt and learn quickly, as the workforce enjoys the knowledge economy

With the ability to capture information and transform it into usable knowledge, in addition to mastering the work by information technologies and their applications in the field of work. One of the factors that help in this is modern technologies that make information available, most notably digital libraries.(DARBINE, MEHADJBI, 2021)

4.3 knowledge economy and its relationship to the digital library

The factors of a knowledge economy are measured by the United Nations Development Program's Global Knowledge Index, which replaced the World Bank Knowledge Economy Index after 2012. This metric scores each country based on "enabling factors" for the knowledge economy, such as education levels, technical and vocational training, innovation, and communications technology. According to the latest issue, the United States is the top-ranked knowledge economy with a total score of 68.4%. The next two are Switzerland and Sweden. (UNDP, MBRF, 2022)

The knowledge economy provides numerous opportunities and challenges for digital libraries and digital information services. The future of creativity will be about doing things differently, selling new services, forming new alliances, and creating new value in a complex, changing, demanding, interactive world with multiple delivery channels claim. Collections and disciplines will grow together, and new management techniques and organizational structures will emerge to manage international networks.

5. CONCLUSION

The technological revolution has brought unprecedented opportunities to the knowledge economy, accelerating the creation, accumulation and dissemination of knowledge within and between countries. Advances in knowledge intensive production are therefore closely tied to the provision of advanced technologies such as digital libraries.

In the knowledge economy, digital libraries can play an important role in promoting information access, supporting lifelong learning, strengthening knowledge culture, promoting research and international cooperation, supporting research innovation and commercialization, and promoting the update of information use. Digital libraries also help to sustainably promote social change in the knowledge society. They help people communicate and interact with each other in an ever-changing social environment, learn new skills and ways of thinking, and entertain and share cultural experiences.

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