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Article

The New Roles of University Libraries in the Transition toward the Digital Information Society - Between Feasibility and Readiness

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Abstract

University libraries have been keen to keep pace with current developments by investing in the opportunities offered by the evolving digital environment to modernise their resources and services. Moreover, they aim to strengthen their position in the Arab world and globally. This is achieved through changes in methods, approaches, and adopted strategies to embrace digital publishing, generate information, and make it accessible within an interactive environment. Such efforts focus on improving access to information and meeting their user communities' academic and research needs. Algerian university libraries have shifted toward scientific management and project-based administration of digital information systems to increase their resources within the modern context of digital education and distance learning through innovative applications and emerging technologies. This orientation enables greater efficiency in terms of time and effort. It facilitates the implementation of best library practices by supporting mechanisms for transitioning toward investment in information and communi-

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cation technologies (ICTs). Furthermore, it promotes the integration of information management digital information in the library sector, thereby encouraging information professionals to adopt and utilise these systems.

Keywords: University library; Digital transformation; Information society.

Introduction

The world is currently witnessing rapid developments in the form of a revolution in information and communication, which ensures the success of scientific and research institutions at all levels. These changes aim to bring about fundamental transformations in this domain to achieve the strategic objectives of information systems, particularly those related to documentation. In line with its efforts to improve service quality across various sectors, including scientific research, the Algerian government has launched initiatives to modernise information practices and reduce reliance on traditional methods. From this perspective, the higher education sector has turned to new digital technologies that aim to demonstrate their effectiveness in addressing issues related to the management, circulation, and secure accessibility of information resources.

These efforts are driven by tools and techniques associated with digital transformation and Fourth Industrial Revolution applications and are part of urgent strategies to revitalise the sector. Algerian universities have consequently established information spaces supported by the digital academic environment, offering information recipients new dimensions through digital options benefits that university libraries have actively embraced and integrated into their services. University libraries are taking new steps to build and develop their collections via modern methods and highly advanced systems. This enables information specialists to perform their duties efficiently within the new environment while enhancing operational efficiency and professional expertise through continuous training and interactive workshops. These efforts aim to keep pace with global developments in the field.

These libraries strive to leverage digital transformation strategies by adopting modern skills and competencies, which will open new horizons for interactive digital content assimilation and effective performance. At the same time, they seek to ensure continuity, data security, and integrity by introducing efficient and adaptable work methods and practices capable of fulfilling the library's goals in light of emerging changes.

1. Problem Statement

Digital technology has significantly transformed many workflow patterns, becoming the primary standard by which nations measure their progress in keeping pace with the information society. To

benefit from the available technologies in the field of information technology, the digital age has introduced new methods and tools that have triggered fundamental changes and strategic shifts across various sectors and institutions.

Digital transformation is considered one of the most important trends scientific institutions adopt to achieve their objectives within a competitive framework that facilitates entry into the digital age. In this context, university libraries have garnered considerable attention because of their effectiveness across both practical and academic domains. They play a crucial role in providing knowledge and information within the academic community, contributing to the personal and professional development of university individuals, students, professors, and professionals and enhancing their skill sets.

From this perspective, the central research problem of the study is formulated as follows:

What are university libraries' new roles and directions in achieving digital transformation within a changing environment?

2. Research Questions

The main question encompasses several subquestions, which are outlined as follows:

- To what extent are university libraries prepared to implement digital transformation technologies that align with the requirements of the information society?
- What is the strategic approach of central university libraries toward digital transformation in a changing environment?
- Is there a genuine and effective implementation of digital transformation mechanisms within university libraries?
- What are central university libraries' main challenges and critical issues in modernising their services?

3. Hypotheses

To address the stated research problem, the study is based on several hypotheses that are considered the most plausible responses to the proposed questions. These are as follows:

- A primary objective of university libraries is to enhance library services in light of modern technologies by applying and activating digital transformation techniques.
- University libraries are striving to develop a roadmap toward digital transformation, for which they have mobilised all necessary material and human resources to access the digital environment.
- Libraries aim to support transformation mechanisms by investing in digital information technologies and using them to benefit users across various sources of knowledge.

4. Significance of the Study

The significance of this study lies in its examination of one of the main factors prompting university libraries to keep pace with the various digital changes and transformations occurring within the academic environment. On the one hand, it contributes to enhancing the overall performance of the university library due to the nature of its services and user community. On the other hand, it highlights the importance of investing in the intellectual and human capital of the university library by integrating digital technologies into library operations, particularly in light of the emergence of new and evolving digital technologies.

5. Objectives of the Study

This study aims to provide answers to the research questions posed. The key objectives can be summarised as follows:

- To explore the extent to which university libraries are prepared to implement a new and effective digital system to improve information services.
- To offer a clear and comprehensive picture of the current state of digital transformation within university libraries.
- To identify the importance of continuous training and professional development for information specialists in enhancing their digital competencies.

6. Methodology

This research adopted the case study method, which focuses on an in-depth analysis of the phenomenon under investigation. A field study was conducted by selecting central university libraries as the research population.

7. Study Sample

Given that the topic of the study concerns the new role of university libraries in the transition toward a digital information society, the academic institution was chosen as the population of interest, with central university libraries serving as the spatial field of the study. The selected samples include the Central University Library of Oran 1 University, Ahmed Ben Bella, and the Central University Library of Oran 2 University, Mohamed Ben Ahmed.

8. Research Tools

Direct observation was used as a primary tool for data collection. In addition, a questionnaire was distributed electronically to heads of departments and divisions within the central university libraries. The interview form included analytically framed questions that addressed the topic of digital transformation in libraries and the development of information specialists within the digital environment. Furthermore, previous studies relevant to the subject matter were reviewed and incorporated into the analysis.

First: The Conceptual Framework of the Study

1. Definition of the Information Society

The information society is one in which information is increasingly used as an interface for economic, social, cultural, and political life. In other words, it is a society that relies primarily on the abundance of information as an investment resource, a strategic commodity, a service, a source of national income, and a field of employment. Most of its members produce, collect, store, process, or disseminate information (Al-Amri, 2009). It represents the transformation from one societal structure to another, where information exists in its most expansive and diverse forms as a dominant and driving force. The information society is characterised by the intensive use of information across all sectors, relying fundamentally on information as a strategic asset and a vital contributor to national development (Al-Amri, 2009).

2. The Concept of the Knowledge Society

The knowledge society focuses on the knowledge cycle and provides an environment conducive to activation, stimulation, and increased efficiency. This includes the general modern technological environment and, more specifically, the environment of information technologies, all of which contribute to developing individual capabilities, enhancing development, and striving toward constructing an integrated society (Olayan, 2008). It can also be defined as the capacity of academic institutions to generate knowledge through educational processes, scientific research, training, lifelong learning, seminars, conferences, and cultural exchange. In this context, the university is a centre of intellectual and civilisational engagement, interacting with knowledge sources in all forms and media. The aim is to build a knowledge society with continued open access to information, circulation, and application across various aspects of daily life, ultimately contributing to the advancement of societies (Abdelhay, 2013).

3. Digital Transformation

Digital transformation is the process by which government sectors or companies shift to a business model that relies on digital technologies to innovate products and services and provide new revenue streams that increase the value of their offerings (Al-Bar, n.d.). It is also described as an era of significant change or, more precisely, a profound societal movement toward progress marked by the widespread adoption of digital technologies across business activities and social processes (Huang, 2017).

For instance, the digital infrastructure of electronic journals may include several features, as outlined by Claude Jolly (2001, pp. 50–54):

1. Mechanisms for file storage and metadata (e.g., static web pages versus database-driven content)

2. File formats (e.g., HTML, PDF, XML, etc.)
3. Processing of graphic and hypermedia content
4. Project management and peer review processes
5. Indexing and hyperlinking to external publications
6. Alert services for users
7. Chat and discussion through hyperlinked connections
8. Statistics on readings, citations, and similar metrics for authors

4. Quality Management in Institutions Under Digital Transformation

Quality management is characterised by features applicable to agricultural, industrial, commercial, and service-based products. In this context, information services that meet user needs are subject to quality standards as defined by the International Organisation for Standardisation (ISO), following globally recognised specifications.

Currently, universities rely on quality policies, total quality objectives, and their applications across academic frameworks. These include key components such as the student, the instructor, the curriculum, and the university administration, all aimed at improving professional performance and competence. Consequently, quality and quality management have become integral parts of institutional management systems in educational establishments worldwide, including universities (Abboud & Farah, 2013).

The Importance of Digital Transformation Applications in the Academic Environment

A digital library is a physical entity that contains a collection of texts in digital form, which are made accessible via hyperlinked technology and available on the internet for remote access. In other words, access to the digital library is only possible through a computer, enabling users to download and copy these texts (Bouguera, 2006).

Digitisation applications rely on various human elements with varied tasks, integrated specialisations, and functional ranks. These are coordinated within an administrative system to accomplish specific objectives on the basis of mutual trust and scientifically informed competencies. Digital transformation in institutions can thus be defined by the human dimension of various technologies and the degree of human interaction and conviction in adopting new technological changes (Qandilji & Al-Samarrai, 2010).

Consequently, users can access digital libraries from any location and via any computer, using specific strategies and methods to retrieve information from their sources. This highlights that conducting research over the internet requires only a network connection and a computer. Therefore, the internet may be called the digital environment (Saleh & Abdelhadi, 2006).

In addition, libraries operating in a changing environment are more prepared to adopt innovations in the field of technology. They offer numerous enhancements to their users by leveraging technologies such as e-books and audiobooks and introducing new forms of communication, such as wikis and blogs. Moreover, libraries can provide access to their holdings through an online public access catalogue (OPAC), and they facilitate the delivery of digitised materials to users upon request (Oudah & Lazim Al-Maliki, 2006).

Mechanisms for Information Access in the Digital Environment

This refers to the various procedures that digital libraries adopt to provide access to their digital content and offer free services that enable users to use this content through digital-era technologies. According to a specific access policy, the aim is to strengthen the library's presence within a changing environment.

Access to digital resources may require subscription fees or payments to benefit from the library's content and services. A set of regulations must also govern accessing and using digital information resources. Several methods exist to facilitate this, including login credentials (username and password), encoded and smart cards, among other tools and usage conditions.

One key issue that may arise is related to copyright. No universally binding regulations require a digital library to share revenue with the original author of the material, a matter typically governed by what is known as the *publishing contract* (Saleh & Abdelhadi, 2006).

Publishing, accessing, and providing information services in the digital environment are often characterised by ambiguity in several areas. This situation necessitates the development of solutions that ensure a balanced relationship between all parties involved in this ecosystem so that the efforts invested in digitisation and the subsequent initiatives that follow are not wasted. Such inefficiencies risk consuming the valuable time needed to keep pace with the rapid developments in this field, particularly in the Arab world, where we are already lagging in entering the realm of digitisation (Ragab Abdel Hamid Hassanain, 2008).

2.1.2. Information Services in the Digital Environment

The digital environment contributes significantly to the provision and availability of various information services, which can be summarised as follows (Khudr, 2010):

1. Enhanced control over electronic information resources allows for more accurate and effective organisation, preservation, and data updating, positively impacting researchers' ability to retrieve this information efficiently.

2. Researchers benefit from the functionalities of digital libraries by using word processing software, machine translation programs, hypertext systems, and multimedia tools.

3. Access to information and services remotely, overcoming spatial and temporal constraints, thereby saving time and effort.

4. Simultaneous access to digital resources by a broad audience of users.

5. Keep pace with global technological advancement by utilising the capabilities of information and communication networks.

6. Contributing to the dissemination of digital information literacy and encouraging researchers and authors to use multimedia resources.

3.1.2. Digital Information Centres

With the advent of the internet, user demands and expectations for access to information resources have significantly increased. Digital libraries aim to meet these evolving needs, enabling users to do the following:

- Contribute to generating, sharing, and utilising knowledge, making societies more effective and productive.
- New communities should be established across sectors through collaboration and participation in research and education.
- Digital libraries are not an end in themselves but rather a new method of managing digital resources, aligning with modern modes of electronic publishing, digital teaching, and learning.
- Serve as essential tools for accessing digital content for purposes such as scientific research, the preservation of cultural heritage, and its promotion (Ali, 2010, pp. 99–100).
- Manage digital resources, electronic publishing, and related activities to support research institutions and educational bodies as follows:
  - Collecting, organising, and storing information in digital formats.
  - Encourage collaboration and support between academic institutions, research bodies, and commercial organisations.
  - Preserving original information resources from deterioration while ensuring continued access for researchers (Olayan, 2009, p. 312).

4.1.2. Information Resources in Digital Information Centres

A digital library is "a library that contains a vast amount of resources in digital (machine-readable) form, alongside printed or microfilm materials. The digitisation process initially began with indexing and abstracting services, then expanded to include journals and reference books, and eventually moved into the field of publishing" (Olayan, 2009, p. 300).

According to Batoush (2005), digital electronic resources constitute a digital library's content. A digital library is built on servers and communication networks connecting it to user terminals.

As noted by members of the Digital Library Federation, "the digital library contains a range of resources selected, generated, interpreted, disseminated, and preserved by specialists within an integrated framework that enables digital works to be made accessible to a defined community or multiple communities, taking into account economic dimensions" (Ibrahim, 2009, p. 144).

Moreover, digital libraries allow the conversion of all information resources into digital formats that can be stored and preserved in various forms on computers. These resources can then be retrieved and interacted with via the internet and web-based services (Olayan, 2009).

Analysis of the Study Results

The primary objective of central university libraries is to satisfy the needs of their user communities by providing access to a wide range of available resources, traditional, electronic, and digital, while also fostering an environment conducive to delivering high-quality services. These libraries aim to attract users and meet their documentary and research needs. Notably, in practice, their focus still leans heavily towards traditional services.

Their core goals are providing information resources that align with users' requirements, facilitating research to disseminate knowledge and expand its reach, striving to create a climate of mutual understanding and communication between patrons and library staff, reducing hierarchical barriers and encouraging user engagement.

Furthermore, these efforts reflect a shift from directive to strategic planning, emphasising the library's external environment within a competitive framework. This strategic orientation enhances information resources and improves administrative and technical workflows to strengthen and guide decision-making processes.

First Axis: Mechanisms for Information Management in University Libraries to Keep Pace with the Information Society

1. Integration of University Libraries into the Modern Environment

Technological advancements in information and communication have led to new digital media through which central university libraries strive to collect and process their collections. These developments have enabled the creation of real alternatives to traditional information storage, access, and retrieval methods, ensuring that the vast outputs of scientific and intellectual production can be used to their fullest potential.

Today, university libraries are increasingly committed to supporting digital academic content by leveraging digital technologies to ensure their sustainability nationally and internationally. This commitment is realised through new projects to make information accessible in various formats and across multiple digital platforms.

2. New Roles of the University Library in the Light of Modern Digital Technology

University libraries face challenges and imperatives today, including adopting new roles introduced by modern technologies in the evolving information environment. A significant proportion of respondents, 88.9%, affirmed this necessity, indicating the urgency of strategic planning to invest in these technological developments effectively. Such planning requires assessing each library's readiness to adopt digital publishing and enriching academic digital content within open access and sectoral governance principles. Furthermore, it generates information in an interactive environment, fulfilling research and educational academic needs.

The adoption and utilisation of digital technologies by university libraries to enhance their services and resources in line with contemporary scientific developments have led to the following:

- The activation of new roles and a shift toward modern society through the creation of communication networks and information exchange systems that offer rapid and efficient services;
- The dissemination and availability of information in newly formatted digital resources through the design of digital collections;
- The reengineering and redesign of operational processes to align with the new digital environment;
- University libraries' presence in the digital space should be strengthened by leveraging digital platforms, artificial intelligence applications, and cloud services to develop innovative solutions that address emerging challenges and crisis impacts.

Second Axis: University Libraries' Readiness to Engage with New Roles

1. Investment in Human Resources

The integration and adaptation of digital technologies are fundamental to development and sustainability in the face of new changes. This has driven efforts to establish mechanisms to empower the library's human element. According to the study results, 66.7% of the respondents believe that they can handle these new roles, primarily through continuous professional training in their field. This includes improving techniques and methods for collecting, processing, and storing information and changing the mechanisms through which it is made accessible.

However, 22.2% of the respondents indicated that they cannot deal with such technologies, often due to resistance to change. They highlighted the need to remove specific barriers that hinder adaptation. Moreover, 11.1% chose not to respond.

Most respondents agreed that investing in human resources through training and development is a foundational element of the modern university library. They stressed the importance of training librarians and users by enhancing their skills, competencies, and capacities to acquire new knowledge

critical to the institution's success and continuity in the digital environment. This view was supported by 88.9% of the participants, whereas 11.1% abstained from responding.

2. Interaction with the Modern Environment of the Contemporary University Library

The current era is characterised by a revolution in communication and information technologies, representing a transformative shift for scientific institutions, including documentation and information institutions. This transformation aims to enable dynamic interaction with the new concept of the contemporary library, a goal that central university libraries actively pursue. This shift is expected to reduce acquisition and processing costs and facilitate faster and easier information retrieval, a benefit that 25% of respondents acknowledged.

Moreover, 18.8% of the respondents reported that the smart use of modern technologies significantly changed information-seeking behaviour and promoted interactivity and flexibility. In addition, many university libraries are moving toward broad dissemination of information to their user communities in various digital formats ,a trend confirmed by 12.5% of participants.

However, the respondents also noted several barriers preventing the full adoption of these technologies, including the following:

- A suitable digital environment is lacking (40%) to improve the efficiency of information access and address users' evolving knowledge needs.
- Modern information management and digital content administration lack awareness or understanding, which are among the most critical outcomes of the digital society (20%).

Third Axis: University Libraries' Readiness for Digital Content Management

1. Requirements and Impacts of Digital Transformation on University Libraries

Among the key demands of the digital age is achieving compatibility, coherence, and effectiveness in information accessibility through a range of documentation services aligned with new content management methods. To this end, it is essential to implement various initiatives that foster innovation and ensure sustainability through emerging technologies, guaranteeing the university library's ongoing relevance. This requires appropriate resources, adequate budgets for change, and a foundational framework built on planning and adapting tools and methods for modern management.

In addition, the process involves the aggregation, exchange, storage, and transmission of information and ensures its sharing with the university's internal and external environments by digital era requirements. Central libraries have also started to rely on the Algerian Union Catalogue (CCDZ), a national catalogue that consolidates the documentary holdings of Algerian libraries. It is a technical approach to encourage collaborative work, information exchange, the development of documentation

services, and broader access to information resources. The CCDZ system enables online cataloguing, the downloading of records, and the submission of these records in digital formats.

As part of reengineering its processes, the central library did not limit itself to using these technologies alone but also adopted other digital tools, such as DSpace repository management software for open access to publish academic digital content. This platform enables the dissemination of library materials according to international metadata standards. The published digital academic content facilitates the creation and indexing of available materials (such as theses, dissertations, and conference papers) and supports their retrieval in various digital formats, including PDF, JPEG, MPEG, DOC, TIFF, and TXT. This approach allows for future data migration and simulation processes.

Given that university libraries strive to improve their services and make their resources available through new media within a virtual environment marked by increasing digital publishing activity, respondents believe that university libraries have become more flexible in their forward-looking vision to identify the evolving variables of the information society. Central university libraries are now facing many of these transformations as they shift toward becoming part of the information society. Therefore, they must take concrete measures to organise and manage their digital collections by providing digital transformation tools and harnessing emerging technologies.

2. Contribution of University Libraries to the Generation and Accessibility of Information for Users

In light of the demands of the information society, current discussions focus on managing the overwhelming flow of information and the wide variety of information sources, in addition to ensuring the quality of their storage and use. According to 44.4% of the respondents, central university libraries contributed to generating and providing user information. This supports redirecting user needs toward digital alternatives and formats and enables immediate responses to research demands. However, 33.3% of respondents believe that the library does not contribute in any way to information generation, citing a complete lack of readiness for this transformation. Moreover, 22.2% abstained from responding.

Thirty-twotwo percent of the respondents cited low cost and ease of use as key advantages offered by the digital environment. These goals are achieved through preparing and disseminating specific research outputs and generating and producing information. This process can be performed rapidly via the internet, electronic publishing, and Fourth Industrial Revolution technologies.

Fourth Axis: Evaluation in Libraries as a Tool for Integration into the Digital Environment

1. Evaluation of Library Work Performance in the Presence of New Digital Technologies

Central university libraries primarily aim to activate their role within the academic community through the evolving functions of information professionals and the challenges of delivering new ser-

vices in the context of digital and emerging technologies brought about by globalisation and increased competition. According to 66.7% of the respondents, library work performance was considered good, while 22.2% rated it on average. Moreover, 11.1% abstained from providing a response or explanation.

A total of 36.4% of the respondents emphasised the importance of staff development, motivation, and user training, particularly in light of the growing importance of information in the knowledge society. This stems from the library's active role in retraining key personnel in information institutions, positioning it as a fundamental pillar of the information society.

Accordingly, workshops and training sessions equip researchers and information professionals with the skills to understand what they are searching for, how to search, and how to achieve their objectives. In contrast, unstructured and random searching leads to undesired interference, often leaving users feeling like they are going in circles owing to the overwhelming variety of available options, especially on the internet.

2. Evaluation of Modern Services Provided by the Library

As confirmed by 62.5% of the respondents, the success of the university library largely depends on selecting the appropriate strategy for diversifying and improving the services offered to the academic community. Moreover, 37.5% of the respondents highlighted the importance of enabling users to access information resources remotely and invest in available resources to create an interactive environment between the library and the information seeker through communication networks and information-sharing platforms.

Modern library services can also be evaluated on the basis of personal experience, which respondents considered essential and needed further support (36.4%). Furthermore, 22.7% of the respondents viewed evaluation as necessary to keep pace with the current era and its demands. Furthermore, 18.2% emphasised the importance of rapid information updating as a foundation for modern services, particularly those based on emerging digital technologies.

The integration of digital technologies and adaptation to them within the library is a fundamental basis for development and continuity amid ongoing changes. It also enriches academic digital content within the framework of the open access movement and sector governance principles. Among the systems adopted in central university libraries are the following:

- SYNGEB (Système Normalisé de Gestion des Bibliothèques)
- A specialised system with a high capacity for data storage, designed for the management of documentation institutions, including university libraries. It relies on the creation of collaborative databases.
- PMB (PhpMyBibli – Integrated Open Source Library Management Software)

- A free and open-source automated system compatible with major operating systems designed for library automation. It allows customisation with numerous features on the basis of the specific needs of university libraries. It has been available in multiple versions since 2003, and in several languages, it is distinguished by its flexibility.
- RFID (radio frequency identification)
- A technology used to monitor and protect electronic information resources. It acts as a security and safety system for library collection and facilitates borrowing and inventory control procedures.
- Dspace
- An open-source platform with high storage capacity for digital preservation was developed through collaboration among libraries. It is freely available online and is one of the most widely used systems for building digital repositories. It supports the Arabic language and is compatible with various database systems.

Fifth axis: Advantages and challenges of the digital environment in the context of emerging technologies

1. Advantages of the Digital Environment

The digital environment offers numerous benefits to university libraries, such as participation in virtual workshops through live online meetings and seminars, attending remote training sessions, and searching for general or specialised information sources. This is achieved by integrating various artificial intelligence tools, which facilitate rapid access to and dissemination of information owing to their ease of use. Thirty-two percent of the respondents acknowledged these advantages.

Additionally, 28% of the studied sample indicated that one of the most significant advantages is the comprehensiveness and currency of information made possible through digital technologies. Compared with traditional mail services, digital technologies in university libraries also enable faster and more cost-effective information exchange. Furthermore, 18.18% of the respondents highlighted the role of digital tools in responding to specific queries and facilitating communication.

All these factors underscore the importance of training in digital technologies to understand their capabilities and wide-ranging applications. This, in turn, can reduce time, effort, and costs while providing more accurate and up-to-date information.

2. Challenges and Strategic Stakes of the Digital Environment

The rapid changes occurring in the digital environment require significant investment in the training and qualifications of information specialists and a shift in organisational culture to adapt to new systems for digital content management and big data management, ensuring their preservation and sustainability.

Artificial intelligence can respond to users' questions and inquiries and enhance acquisition procedures through AI-powered assistants. Furthermore, its applications can support the management of smart library buildings by optimising energy and resource usage and providing users with information about books and resources via smartphones and tablets.

One of the most significant challenges that university library institutions face is adapting to new technologies. Transitioning from legacy to modern digital systems requires substantial effort and allocating financial and technical resources, particularly those related to attracting expertise. This also includes ongoing maintenance costs, regular system updates, and data migration.

Digital transformation demands continuous innovation and renewal to keep pace with the rapid evolution of digital technologies. Addressing these challenges requires collaborative efforts in technical projects and strategic planning that strikes a balance between innovation and the reinforcement of sustainability. It also calls for genuine investment in human and technological resources and effective change management to enhance operational performance and interactivity.

This approach is essential for developing innovative scientific projects and establishing mechanisms for activation, communication, and scientific and technological exchange among academic institutions. These efforts are key to achieving digital transformation goals and modernising university libraries.

4. General Findings of the Study in Light of the Hypotheses

University information institutions have begun to adopt a new reengineering mechanism that responds to knowledge users' needs within the academic environment. This includes digitising information resources and enhancing the efficiency of diverse knowledge assets as a sustainable strategic choice and a value-added approach to managing and promoting academic scientific content and facing new challenges in the information age.

These are new steps that university libraries are taking to equip their personnel with modern skills through training in contemporary library operations. The goal is to build and develop digital collections by gathering, processing, and disseminating information via digital and emerging technologies imposed by the Fourth Industrial Revolution.

Today, university libraries are more than ever required to avoid past mistakes and to transition from traditional work models to the adoption of digital technologies, including redefining the roles of those responsible for library services. Therefore, the first and second hypotheses are confirmed.

University libraries strive to keep pace with modern developments within the future higher education and scientific research framework. They are launching initiatives to benefit from digital technologies to manage and provide information in ways that increase efficiency while also interacting with

digital entities to support their outputs. These changes have required libraries to adopt new roles to maintain their service to the academic and research community. Consequently, the third hypothesis is also confirmed.

Conclusion

Digital library maturity contributes to creating innovative new working mechanisms, enabling the formation of library teams led by individuals with subject-matter expertise and digital competence. Achieving digital maturity requires the integration of emerging technologies to support the adoption of new approaches in planning and performance, as well as the development of new operational models that enhance efficiency and improve the operational performance of information professionals in university libraries.

Improving the effectiveness and performance of university libraries can be achieved only through collaborative and communicative efforts to address challenges and obstacles. This involves providing alternatives and solutions as a strategic option that supports total quality management and professional development. Such advancements are made possible only through digital transformation, which enhances responsiveness to the demands of the information society.

The primary aim of the advanced university library is to support academic research and enrich the educational process through methods and services that allow for the use of digital technologies across various media. It must also enable the activation of new library roles and activities by promoting open-access initiatives, enhancing digital repositories, and strengthening academic digital content.

Central university libraries are now required to face various challenges and strategic stakes, including the new roles of information professionals brought about by modern technologies in the evolving information environment, as confirmed by the study participants. Moreover, libraries must ensure the security and integrity of their data, which necessitates effective planning and genuine investment in technological developments. Each library must assess its readiness to adopt digital publishing and generate information within an interactive environment that meets research and educational demands, all within the boundaries of intellectual property rights.

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