

## Research paper

# Challenges of Creating and Operating Digital Libraries in the Digital Age in Iran

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### Abstract

One of the most important issues for libraries in the age of digital transformation is digital content management from the perspective of resource digitization. The purpose of this article is to examine the challenges of implementing and implementing digital libraries in Iran and to provide solutions to solve it.

In this study, using a review of the literature research, the challenges of building and launching digital libraries in Iran were investigated. Then, with using likert scale, the challenge ranked by experts in the field of digital library construction in Iran. These challenges were weighted using the AHP Analytic Hierarchy method. Finally, a framework was devised to solve them.

Based on findings there are issues and challenges in the field of human force, copyright and legal issues, information security and protection, confusion in the organization of digital resources, lack of budget, difficulty in accessing digital library software, and its distance from global standards.

To solve the challenges of building a digital library, it is necessary to pay attention to the following solutions: Holding training courses to get acquainted with the operation of digital devices, Fair or free use of works, Use of global data identification system, Set an adequate budget for digitizing resources, Creating constructive interactions between experts in the field of digital libraries inside and outside countries to transfer lessons learned globally.

**Keywords:** digital transformation, digital library, challenge, resolve

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## Introduction

Digital transformation is the use of digital technologies to create new business processes or change the business, culture, and customer experiences. This re-imagining of business in the digital age is called digital transformation. Digital transformation in management literature has been considered as one of the requirements of all-around transformation in order to meet the needs of the knowledge age (Hassanzadeh, 1399). Libraries, as important institutions of knowledge sharing, are strongly influenced by digital transformation.

In fact, digital transformation has provided a variety of capabilities and environments for the production, processing, storage, search, retrieval, and, in general, accessibility of information, including the Creating efficient and effective digital libraries is one of these environments and capabilities.

The concept of the digital library is in conformity with the goals, audience, and definitions of traditional libraries, but information technology has been influential in the development of the traditional library idea. Cleveland lists the following features for digital libraries:

1. Digital libraries are the digitized form of traditional libraries and include digital collections and fixed carriers of traditional collections. Thus, these libraries include both electronic and paper resources.

2. Digital libraries include all the processes and services that are the foundation of any library. Although these traditional processes form the basis of digital libraries, they are being revised and developed to be compatible with new digital media.

3. Digital libraries ideally have an attitude towards all library resources and do not consider the form and format of that information.

4. Digital libraries serve specific communities or areas of users. Like what traditional libraries do now, except that these communities may be scattered over the Internet (Cleveland,1998).

In Schwartz's definition, digital libraries are complex systems that not only develop organizational resources and capabilities but also offer unparalleled opportunities to provide new and improved services to their users (Schwartz 2000).

Therefore, the evolution of the concept of digital libraries has been widely influenced by the approaches of different specialized fields and organizational needs, and operational definitions provided in applied research.

Digital libraries are one of the works of the great information and communication technology revolution that has led to the growth and development of the global community; UNESCO also launched the World Digital Library on April 21, 2009, in collaboration with 32 institutions to produce valuable works such as manuscripts, maps, films, etc. for public use in the world. Hence, the development of knowledge and its availability to the general public of the world is a goal that everyone strives for. In Iran, as in other countries, the issue of digitization of libraries and the change from traditional to electronic form has been considered by various organizations and experts. And different researchers from different angles have studied the subject of digital libraries. There is no doubt about the need to move towards digitalization, but doing it right and continuing requires serious consideration of challenges and solutions. These measures include technical, legal, social, and economic considerations.

A review of various studies shows that there are problems and challenges in the creation and operation of digital libraries, which have been addressed sparsely in various studies. But now, with the advent of the digital age, the need to address these challenges and provide solutions to address them is fundamental. Since in the age of digital transformation, digital libraries must be able to meet the needs of the audience, therefore, this study seeks to provide a solution in this regard by examining the challenges in creating and operating digital libraries based on the opinions of experts in the field of digital libraries.

### **Research background**

Due to the importance of digital libraries in recent years, many studies have been conducted in the field of digitalization of libraries, concepts, challenges, use of technologies, and related issues. The advent of technologies in libraries has changed almost all librarians' activities, but also some challenges, including the need to update new knowledge and skills, re-evaluate strategic plans, change new job titles, add new responsibilities, and having installed the relevant infrastructure (Monja, 2013). On the other hand, it is important to pay attention to the challenges of integrating visual search interfaces in libraries and digital repositories, including information visualization, the use of knowledge management systems, and metadata quality (Gaona-García et al, 2017). With the creation of a digital library,

concepts such as big data are also being considered which includes big data inside libraries such as user behavior data and digital resources literature and other big data outside libraries such as big scientific data needed by digital libraries and identifying these to help improve digital library services. Li et al, 2019). Other issues include copyright, which includes topics such as the meaning, features, and benefits of the digital library. Copyright challenges in creating digital libraries include licenses for the digitization of copyrighted material, important issues affecting accessibility and use of electronic information resources such as overprotection of information, also lack or limitation of knowledge about copyright among users and librarians, digital rights management (DRM), access to works published by visually impaired people, and the work of orphans (Kamau, 2018). Assessing the usefulness of digital library resources can also provide valuable insights into the digital resources of academic digital libraries (Jabeen et al, 2017).

In Iran, the study and description of semantic digital libraries in terms of structure, issues, benefits, challenges, and their impact on information retrieval in specialized libraries has been done and shows that the use of semantic technologies and social networks (Web 2), has started in the context of digital libraries, and digital libraries are transitioning to a meaningful digital library that provides more facilities for content management, service delivery, and user access to resources (Izadi and Shahini, 2018). Also, studies have been done on copyright in digital libraries (Radfar, 2020; Soleimani Tabar and Asadi, 2017), and software, hardware, and network experts, site technical supporters, and resource conversion experts with the highest rank are considered the most important library staff in digital libraries in Iran (Nowruzi et al., 2018). In general, the results of Nowruzi et al. (2018) showed that from the perspective of managers, the use of technical experts, in-service training, and attention to the digital collection in improving the situation of digital libraries in Iran are more effective than other components. On the other hand, resource discovery, digital collection development, conservation, digital library management, copyright and licenses, and the cost of problems are the challenges of digital libraries (Soleimani and Asadi, 2017). Preventing potential damage, information security, and preventing unauthorized access are among the security challenges and protection of resources and content in digital libraries, and digitizing works also increases the

risk of infringing on the rights of authors and creators, because one of the most important features of the digital environment is ductility and the ability to deform works to a high degree (Tajabadi et al., 2015). Proper management of digital libraries depends on having managerial knowledge and developing a regular schedule, paying attention to the challenges and limitations of the digital library, the capabilities of the librarians (library, standards and requirements of the digital library search interface, and attention to the needs of users (Sadeghi et al., 2015). In digital libraries, the technical context in the development of digital libraries should also be considered, as well as the legal issues and challenges of literary and artistic property that libraries face. They are faced with a new problem that can be answered by applying the rules and exceptions to the intellectual property rights of the real environment with the digital environment. Besides, the difference is not in the nature of the rules, but in the manner of implementation and supervision of intellectual property rights in these two environments (Shoja and Al-Wankar, 2013). The lack of a clear and transparent framework for defining the ownership of digital publishing has caused people to prepare other copies of the original version and make it available to others without any fear of legal prosecution (Ismailzadeh, 2012). Copyright, information security, freedom of information, privacy, information censorship, information updates, and information validity are indicators of information ethics. Rules and regulations are part of information ethics that affect the digital environment (Nouri and Shah Shojaei, 2012).

A review of various texts shows that the challenges of digital libraries in Iran have been studied sporadically in several studies, but these challenges have not been by ranking technique. To solve the problems of designing and operating digital libraries, it is necessary to recognize the important challenges. Therefore, this study, using the fuzzy hierarchical technique, first examines the challenges of digital libraries and then provides solutions for them. The questions of this research are:

1. What is the relative weight of challenges in digital libraries based on Analytic Hierarchy Process (AHP)?
2. How do you prioritize digital library challenges based on relative importance or preference?

### **Research Elaborations**

The present study is applied in terms of purpose and descriptive-analytical in terms of method. The method of this research can be summarized in 3 parts:

First, the challenges in creating and developing digital libraries were examined by reviewing articles in this field, and then these challenges were set in the form of Likert scale.

In the second step, the questionnaire (Likert list) was sent to 30 librarians and managers who had experience in creating a digital library in Iran. Finally, using the weighting method, evaluation criteria, using the hierarchical analysis process and the AHP method, the challenges of creating and developing a digital library in Iran were investigated. Finally, suggestions were made to solve these problems.

### **Research tools**

By searching Persian and foreign databases about the challenges of building digital and hierarchical libraries, consisting of the challenges in this field were collected. Then, according to the drawn tree, a list consisting of criteria was designed as a paired comparison of challenges. According to the approval of experts in this field, the tool had internal validity.

AHP Analytic Hierarchy Process is a multi-indicator decision-making method for weighting criteria and selecting the optimal option. This method was introduced by Thomas Saati in 1983. The purpose of this method is to prioritize a number of criteria or options. Once the goal has been set, criteria for decision-making must be identified. These criteria are paired based on purpose and their weight is determined. Finally, the options are paired based on each criterion and the final priority of the options is determined.

The main purpose of the hierarchical analysis process method is to select the best option based on different criteria through paired calculation. In the present study, the weighting of evaluation criteria is done using the hierarchical analysis process and the AHP method. In this research, the following five points are first used:

**Table 1. Five point spectrum**

Alignment	A little important	Slightly important	Important	Definitely important
1	3	5	7	9

### Statistical Population

The statistical population of this study consisted of librarians and digital library administrators who had at least one of the following characteristics:

Librarians with experience in the field of design and construction of digital collections, managers with experience in the field of digitalization of collections, experts in the field of digital library with experience in the field of construction and management of digital libraries Therefore, 30 of these people were identified and sent to them in the form of a Google questionnaire.

### Results or Finding

Using the Likert scale designed in this research, each of the challenges is compared in pairs, and the results of these comparisons are given in the matrix tables.

**Table 2. Paired comparison matrix of challenges in digital libraries**

challenges	Information security and protection	Copyright and legal issues	Lack of experts	Lack of budget and financial issues	Problem with access to digital library software	The distance between digital library software and global standards	Confusion in the organization of digital resources
Information security and protection	1	1.9	1	9	9	1	1
Copyright and legal issues	9	1	1.9	1.9	9	5	1.9
Lack of experts	1	9	1	9	9	9	9
Lack of budget and financial issues	1.9	9	1.9	1	1.7	9	1.9
Problem with access	1.9	1.9	1.9	7	1	9	1

challenges	Information security and protection	Copyright and legal issues	Lack of experts	Lack of budget and financial issues	Problem with access to digital library software	The distance between digital library software and global standards	Confusion in the organization of digital resources
to digital library software							
The distance between digital library software and global standards	1	1.5	1.9	1.9	1.9	1	1
Confusion in the organization of digital resources	1	9	1.9	9	1	1	1

After drawing the matrix table of paired comparison of challenges, the relative weight of the challenges in terms of importance and priority is calculated using the arithmetic mean method in three consecutive steps. In the first step, the values of each column were summed up together, the results of which are given in the table below.

**Table 3. Step 1: Calculating the Weight of Challenges in Digital Libraries (Using Arithmetic Mean Method)**

challenges	Information security and protection	Copyright and legal issues	Lack of experts	Lack of budget and financial issues	Problem with access to digital library software	The distance between digital library software and global standards	Confusion in the organization of digital resources
<b>Information security and protection</b>	1	1.9	1	9	9	1	1
<b>Copyright and legal</b>	9	1	1.9	1.9	9	5	1.9



challenges	Information security and protection	Copyright and legal issues	Lack of experts	Lack of budget and financial issues	Problem with access to digital library software	The distance between digital library software and global standards	Confusion in the organization of digital resources
issues							
Lack of experts	1	9	1	9	9	9	9
Lack of budget and financial issues	1.9	9	1.9	1	1.7	9	1.9
Problem with access to digital library software	1.9	1.9	1.9	7	1	9	1
The distance between digital library software and global standards	1	1.5	1.9	1.9	1.9	1	1
Confusion in the organization of digital resources	1	9	1.9	9	1	1	1
<b>Total</b>	<b>13.22</b>	<b>28.42</b>	<b>2.56</b>	<b>35.22</b>	<b>29.25</b>	<b>35.</b>	<b>13.22</b>

In the second step, we divide each element in the paired comparison matrix into its own column to normalize the paired comparison matrix.

**Table 4. Step 2: Normalized Paired Comparison Matrix of Digital Library Challenges**

challenges	Information security and protection	Copyright and legal issues	Lack of experts	Lack of budget and financial issues	Problem with access to digital library software	The distance between digital library software and global standards	Confusion in the organization of digital resources
Information security and protection	.076	.003	.390	.255	.308	.029	.076
Copyright and legal issues	.680	.035	.044	.004	.308	.142	.008
Lack of experts	.076	.317	.390	.255	.308	.257	.680
Lack of budget and financial issues	.008	.317	.044	.028	.005	.257	.008
Problem with access to digital library software	.008	.003	.044	.199	.034	.257	.076
The distance between digital library software and global standards	.076	.008	.044	.004	.003	.029	.076
Confusion in the organization of digital resources	.076	.317	.044	.255	.034	.029	.076
<b>Total</b>	1	1	1	1	1	1	1



Given the relative weight obtained in the table above, the Priority vector that shows the relative Priorities of digital library challenges based on importance is as follows:  
(.034,.089,.095,.119,.162, 0174,.327)

### Question 2:

How do you prioritize digital library challenges based on relative importance or preference?

Finally, according to the results of weighting the challenges and examining their relative preferences, the challenges in digital libraries are prioritized and presented in the table 6.

**Table6. Prioritization of digital library challenges**

Challenges	Relative weight	Prioritization
Lack of experts	.327	1
Copyright and legal issues	.174	2
Information security and protection	.162	3
Confusion in the organization of digital resources	.119	4
Lack of budget and financial issues	.095	5
Problem with access to digital library software	.089	6
The distance between digital library software and global standards	.034	7

### Conclusions

As mentioned, to build digital libraries there are issues and challenges in the field of human force, copyright and legal issues, information security and protection, confusion in the organization of digital resources, lack of budget, difficulty in accessing digital library software, and its distance from global standards.

Library managers and officials in this field should build digital libraries with attention to these issues and having sufficient knowledge. To further understand the challenges and issues mentioned above and related solutions, a general overview is summarized in table 7. The general recommendation is that in building a digital library, considering that it is time-consuming, costly, and challenging, a strategic plan should be developed so that the construction of a digital library can be done with a comprehensive and detailed view. With the development of this program, all the strengths and weaknesses, solutions, and actions in various fields, from

changing attitudes to providing services to users, are anticipated and operationalized.

N	Challenge	Solutions
1	Lack of experts	<ul style="list-style-type: none"> <li>• Holding training courses to get acquainted with the concepts and techniques of building a digital library and creating opportunities for staff in seminars and workshops related to the digital library</li> <li>• Review the library recruitment chart to create organizational positions for digital library operators</li> <li>• Holding training courses to get acquainted with the operation of digital devices</li> <li>• Develop guidelines and regulations to guide digital library operators</li> <li>• Creating several specialized courses Introduction to the digital library in the formal education</li> <li>• Forming a digital library association to raise issues and challenges and find solutions to deal with them</li> </ul> <p>Improve the skills of digital librarians by holding the following specialized courses:</p> <ol style="list-style-type: none"> <li>1. Management of digital libraries</li> <li>2. Organizing information and knowledge management</li> <li>3. Dissemination of digital information</li> <li>4. Provide access to and marketing of digital resources</li> <li>5. Storage, organization, and protection of digital resources</li> <li>6. Resource conversion management</li> <li>7. Digital information processing</li> </ol>
2	Copyright and legal issues	<ul style="list-style-type: none"> <li>• Fair or free use of works</li> <li>• Copying of works supported by Article 8 of the Law on the Protection of Authors, Jurists and Artists 1970</li> <li>• Reproduction and copying of books for use in education and research with reference to Article 5 of the Law on Translation and Reproduction of Audio Books and Works</li> <li>• Adherence to the Digital Age Copyright Act of the United States, 1998</li> </ul>
3	Information security and protection	<ul style="list-style-type: none"> <li>• Use labeling</li> <li>• Cryptography</li> <li>• Use of global data identification system</li> <li>• Electronic licensing</li> </ul>
4	Confusion in the	<ul style="list-style-type: none"> <li>• Use the appropriate metadata format</li> </ul>

N	Challenge	Solutions
	organization of digital resources	<ul style="list-style-type: none"> <li>• Prevent duplicate information from entering the software</li> <li>• Prevent the entry of incorrect information</li> <li>• Enable automatic indexing of resource content</li> <li>• Establish a memorandum of understanding to exchange information between the software of different organizations</li> <li>• Uniform organization of information</li> <li>• Exchanging information to reduce cataloging and organizing time as well as content consistency</li> </ul>
5	Lack of budget and financial issues	<ul style="list-style-type: none"> <li>• Set an adequate budget for digitizing resources</li> <li>• Spread the culture of paying attention to the organization's digital libraries</li> <li>• Moving from buying print resources to electronic resources</li> </ul>
6	Problem with access to digital library software	<ul style="list-style-type: none"> <li>• Use standard digital library software</li> </ul>
7	The distance between digital library software and global standards	<ul style="list-style-type: none"> <li>• Forming groups to study and review internal software and analogy with foreign software and develop solutions to fill the existing gap</li> <li>• Creating constructive interactions between experts in the field of digital libraries inside and outside Shakur to transfer lessons learned globally</li> </ul>

Examining each of the solutions shows that education is an important link in solving the challenges of digitizing resources in Iranian libraries. Proper and timely training always provides the necessary scientific support to achieve optimal efficiency and effectiveness in professional and specialized activities. Librarians in digital libraries today need to be more and more at the forefront of creating regular curricula. Besides, librarians in the field of digital libraries have to work with other disciplines such as computer science and communication experts. On the other hand, to improve their professional skills, they must tend to new trends such as knowledge management. Organizing knowledge management committees in organizational libraries to use the knowledge and experience of other libraries in solving challenges and using the practical experiences of other librarians is one of the most important solutions in solving this problem in the age of change. Library administrators are expected to do just that. Undoubtedly, the key to the survival and development of

libraries in the era of digital transformation is to use the experiences of successful libraries in setting up and implementing a digital library by international standards.

**Recommended Citation**

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