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Researchers' vision for the prospects for investing in artificial intelligence applications in the governance of university libraries

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Abstract

The study aims to highlight the role of artificial intelligence applications in governing university libraries and assess the awareness of researchers in library and information science at Algerian universities regarding the applications that can be utilized in governing university libraries. The descriptive methodology was adopted, relying on collecting, describing, and analyzing data through the use of a questionnaire distributed to 42 professors of various ranks.

The study concluded with limited awareness of the study sample regarding artificial intelligence applications that can be employed in governing university libraries. Additionally, it identified legal and legislative challenges, as well as human resources constraints, hindering the effective utilization of artificial intelligence applications in governing Algerian university libraries.

✓ **Keywords:** Artificial Intelligence, Library governance, Algerian researchers.

1. INTRODUCTION

Artificial intelligence (AI) in the current era represents a technological necessity across various institutions. It enables numerous systems and software applications that assist in understanding and analyzing data like human capabilities. The applications of AI vary in their use across different fields such as data analysis, decision-making, and problem-solving.

Amid the rapid development in technology and the academic community's needs, the governance of university libraries in Algeria remains an inevitable necessity. It requires vigilance and adaptation to innovations to continuously and effectively meet the academic community's needs. In this context, the role of AI applications emerges as a driver to accelerate the governance of university libraries by enhancing information management, improving services, and interacting with beneficiaries.

Within this context, the study titled "Researchers' Perception in Library and Information Science of the Prospects for Investing in Artificial Intelligence Applications in Governing Algerian University Libraries" aims to highlight the extent of awareness among professors of Library and Information Science at the universities of M'sila, Djelfa, and Biskra regarding artificial intelligence applications that can be utilized in governing university libraries. The researcher seeks to shed light on the difficulties and challenges hindering their effective deployment

1.1. The Study Problem:

Employing artificial intelligence applications in governing university libraries amidst the numerous challenges facing this process, one of the most prominent being the lack of compatibility between existing systems and artificial intelligence technology. Current legislation and policies are insufficient to activate the use of these applications in university libraries. Other challenges include the lack of training and qualifications for library personnel to understand and effectively use these applications.

The costs of investing in and updating the infrastructure for artificial intelligence

technology are prohibitively high given the limited budgets of university libraries. Additionally, there are cultural and organizational challenges that require adapting the current organizational culture to new technologies and applications.

In light of these challenges, it has become necessary to propose effective and practical solutions that contribute to the efficient investment of artificial intelligence application capabilities in serving university libraries better and more effectively. This leads to the main question: What is the role of artificial intelligence applications in governing Algerian university libraries from the perspective of library science professors at the universities of M'sila, Djelfa, and Biskra?

The study's objectives can be achieved, and the main research question can be answered by addressing the following sub-questions:

- What is the familiarity of library science professors with artificial intelligence applications that can be employed in governing university libraries?
- What are the prominent artificial intelligence applications that can be used in governing university libraries?
- What are the methods and capabilities for employing artificial intelligence applications in governing university libraries?
- What are the difficulties and challenges that hinder the investment in artificial intelligence applications in governing university libraries?

1.2. Study Hypotheses:

- Professors of Library Science at the universities of M'sila, Biskra, and Djelfa have limited knowledge of artificial intelligence applications used in governing university libraries.
- Library science professors affirm that the infrastructure, technology, and human resources of university libraries do not facilitate the deployment of artificial intelligence applications in governing university libraries.

- Legal challenges, financial constraints, technological difficulties, and human factors impede the effective investment in artificial intelligence applications for governing university libraries.

1.3. The Importance of Studying:

There is no doubt that modern technological applications have an impact on various fields, especially in the realm of gathering, processing, storing, accessing, and disseminating information. This is particularly evident in artificial intelligence applications that can be utilized and leveraged in university libraries to facilitate access to information sources and manage the scholarly processing of vast and growing intellectual output to meet researchers' needs. This prompted us to address the topic and provide an overview of artificial intelligence applications that can be deployed in university libraries to deliver services in line with users' expectations

1.4. Objectives Of the Study:

Through this study, we aim to understand the perspectives of library and information science professors regarding the feasibility of deploying and investing in artificial intelligence applications in university libraries, and enhancing their services in line with academic community trends. Additionally, we seek to explore the solutions offered by artificial intelligence applications for university libraries. The study aims to achieve the following objectives:

- Highlight the theoretical framework surrounding artificial intelligence applications in libraries and assess the level of awareness among library science professors.
- Assess the professors' awareness of the current infrastructure of university libraries, including their technological, financial, and human readiness for deploying artificial intelligence applications.
- Identify the main difficulties and challenges hindering the effective investment in artificial intelligence applications in university libraries.

1.5. Study Approach:

The nature of the subject necessitates relying on the descriptive approach, which relies on analytical methods to explain and depict the phenomenon under study. This approach relies on collecting theoretical information and field data on the study subject and then analyzing it to reach results that clarify different aspects of the subject (zarawati, 2007, P86).

1.6. Information gathering tools:

Due to the nature of the study, we used a questionnaire as a data collection tool. The questionnaire form is the optimal and fundamental tool for data collection, as its role is not limited to presenting mere questions but rather serves as a catalyst for discussing a carefully studied issue, thus contributing to covering various aspects of the subject comprehensively (khayr allah, 2002, P73).

1.7. Study population and sample:

When selecting the study population, consideration was given to its relevance to the study topic and the research problem. The study population consists of library science professors at the University of M'sila, the University of Djelfa, and the University of Biskra. A comprehensive survey was used to select a representative sample covering various academic ranks and levels. The study sample comprises 42 permanent and temporary professors, The results of the distribution of gender in the study sample indicate a higher percentage of females at 61.5% compared to 38.5% for males. This distribution could be significant in understanding the demographic distribution and gender-specific trends of professors towards modern applications and technologies.

Regarding the educational levels of the study sample, there is a high proportion of Associate Professors (A) and (B), comprising approximately 57.14% of the sample together. This indicates a high level of expertise and competence in the human resources pool. In contrast, there is a lower presence of Assistant Professors and

Temporary Professors, suggesting challenges in employing researchers from these categories.

The distribution of the sample results across universities shows that the University of Biskra has the largest proportion at 54.76%, compared to 23.80% for the University of Djelfa and 21.42% for the University of M'sila. This indicates that the University of Biskra has the highest representation in the study sample, which could assist in analyzing the study's findings

1.8. Study concepts:

1. Artificial Intelligence: The term "Artificial Intelligence" first appeared in 1956 when American researcher McCarthy adopted it, using the phrase "Artificial Intelligence" as the title for a conference at Dartmouth College, marking the beginning of research in the field of Artificial Intelligence as an independent field. McCarthy defined Artificial Intelligence as "the science and engineering of making intelligent machines." In 2007, he stated that "Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs."(Ahmed, 2022, p135).

2. University Libraries Governance: The term "governance" here refers to the set of structures, procedures, processes, and activities adopted for the planning and management of entities and individuals active in the field of higher education. These elements can enable qualitative progress towards self-reform, based on principles of independence and freedom in their management affairs (Shekhawi, 2016, P97).

Governance in universities in general, and in university libraries in particular, represents a set of plans, methods, and regulations aimed at organizing the higher education sector.

Through studies related to the subject, we see that library governance works on promoting establishment, performance, development, or change.

Establishment: It begins from the establishment of the library and the formation of

the team to the start of operations, establishing and adjusting the organizational units of the library, and controlling all its departments, components, and relationships.

Performance: Ensuring consistent and stable performance of tasks by the staff and organizational structure and employing technology.

Change and Development: Transitioning from one stage to another more advanced stage or from an old state to a new one achieves the ultimate goal of the library, and to achieve this, it must be managed properly (Badi& Al-Oshi, 2020, P.P 369-370).

1.9. Previous Studies:

- The study by Badi and Al-Oshi (2020) examines the relationship between governance and enhancing the role of libraries in the field of e-learning. This research aims to develop a change management perspective in libraries to improve the delivery of e-learning during crisis times. Governance is considered a vital mechanism for achieving performance quality in this context. The research also aims to extract governance dimensions that libraries should adopt to effectively enable the delivery of e-learning.

The study concludes that governance serves as the essential roadmap for libraries, providing necessary guidance for the systematic transition to the e-learning environment. It contributes to improving library performance and ensures access for end beneficiaries under any circumstances. Additionally, the study proposes dimensions that enable libraries to achieve effective transition to e-learning, based on strategic principles, including crisis management plans and change management. The study also emphasizes the importance of incorporating training programs and awareness of the significance of e-learning for human resources (Badi& Al-Oshi, 2020).

- The study by researcher Al-Khalifa (2020) addressed the role of artificial intelligence in information retrieval by examining the "talk to books" application

developed by Google. The study explored the usage of this application and the associated search and retrieval processes. It also facilitated an understanding of the relationship between machine learning technology and artificial intelligence. The study highlighted the significance of the semantic web in the information retrieval process using the "talk to books" tool. Relevant projects were reviewed as part of the study.
The study concluded that "talk to books" represents an advanced retrieval tool that relies on input data and predicts the desired responses to queries from a set of options (Al-Khalifa, 2020).

- The study by researcher Hind Abdallah Hindi Ahmed (2022) conducted a study that examined a range of studies exploring the use of artificial intelligence in the field of libraries and information. This study aims to conduct a quantitative and qualitative analysis of the characteristics of Arab and foreign intellectual production registered on this subject. The research focused on specific topics such as the use of smartphone applications in libraries and tracking intellectual production published in databases such as Scopus, Web of Science, and Dar Al-Manzouma Database, in addition to using the "Google Scholar" scientific search engine. The study reviewed publications from 2010 to 2021.

The study concluded that the vast majority of studies addressing the use of artificial intelligence in the field of libraries and information are theoretical studies. They presented concepts and narratives of technologies already used in libraries under various names. The study noted confusion in concepts related to artificial intelligence technologies and applications, especially in studies published in Arabic (Ahmed, 2022).

- The study by Saddar and Rahal (2018) titled "Governance of Public Libraries in Algeria: What Role in Improving Performance?" aimed to highlight the role of governance principles in enhancing the image and performance of public reading libraries in Algeria, as well as ensuring the quality of services they provide.

Following a field study at the main public reading library in the Tébessa province,

the study concluded that both accountability and participation, within the governance framework, are effective factors in the performance of public libraries (Saddar& Rahal 2018).

2. Knowledge of Researchers In Library Sciences About The Nature Of Artificial Intelligence And Its Applications In University Libraries:

Amidst technological advancements, understanding the concept of artificial intelligence (AI) and its applications has become essential for researchers in library science to keep pace with digital transformations and challenges facing university libraries. AI is an integral part of modern information technologies and has a significant impact on how services are organized and provided for information specialists in university libraries.

2.1. Knowledge of what artificial intelligence is in the field of libraries:

Artificial intelligence represents a modern field in computer science aimed at developing systems capable of executing tasks that require intelligent thinking. It relies on using data to analyze patterns and make smart decisions, making it a crucial focal point in modern technological advancement. The study sample expressed their awareness of this through the results they conveyed.

There was a positive response from the participants regarding their understanding of the concept of artificial intelligence. It appears that 40.47% of them see artificial intelligence as related to the ability of systems to efficiently execute tasks and achieve goals intelligently. This analysis reflects a deep understanding of the benefits of artificial intelligence in improving performance and achieving goals effectively. Meanwhile, 28.57% indicate that it reflects the ability of systems to simulate human intelligence, suggesting a view of artificial intelligence as a simulation of human capabilities, indicating an understanding of the potential similarity between artificial intelligence and human intelligence. Additionally, 19.04% point to the ability to use

data and learn patterns, indicating a focus on technical aspects and machine learning as essential elements of artificial intelligence.

This diversity in understanding the concept and comprehensive awareness of the basic elements of artificial intelligence among the participants indicates a well-grasped understanding of the fundamentals of artificial intelligence. However, there is variation in their preferences and understanding of the different aspects associated with it.

2.2. Artificial Intelligence Applications Used in University Libraries:

Employing cutting-edge technologies in libraries forms the basis for implementing artificial intelligence, allowing for the improvement of processes such as indexing, classification, and collection development. This is evident through various applications of artificial intelligence, such as the use of expert systems, robots, the Internet of Things, smart libraries, augmented reality services, and intelligent knowledge tools like data mining. The results expressed in the survey by the study sample show diverse choices regarding the most commonly used artificial intelligence applications in modern libraries.

A small number of participants, representing 16.36%, indicated the option of smart libraries, indicating an interest in technology used to enhance library services. Regarding the use of expert systems, 27.27% expressed interest in artificial intelligence applications to improve information management and provision. The use of robots in libraries was indicated by 12.72% of respondents. The option related to the use of quick response codes in libraries was chosen by 23.63% of participants, reflecting its important role in providing quick and efficient access to information. Meanwhile, the Internet of Things, specifically RFID location tracking systems, was expressed by the highest percentage of the sample, at 38.18%, indicating its effectiveness in locating various services provided to beneficiaries.

Through the response options of the study sample, artificial intelligence applications used in libraries can be categorized into:

1. Expert Systems in Library Science:

Expert systems are one of the artificial intelligence applications that can be used as a comprehensive solution for library and information problems. Their goal is to facilitate access to databases, retrieve relevant information, and rely on it for providing consultations, making decisions, and suggesting solutions for specific situations. These systems vary in scope from simple systems that rely on static data to complex and integrated systems that take years to develop. Prominent components of expert systems include knowledge base, inference engine, and user interface (Ahmed, 2022, P136).

Expert systems in libraries can be used for collection development, cataloging and classification, indexing and abstracting, and information retrieval (zyn, 2000, P.P.95-101)

2. Bibliothèque Intelligente:

Among the applications and services of artificial intelligence is the construction and design of smart libraries, which represent the next generation of libraries after digital libraries. Artificial intelligence libraries come as a new generation associated with several dimensions, including a focus on sustainable development thinking and the adoption of modern technology in various fields, in addition to addressing the characteristics of modern society and its diverse needs (Ahmed, 2022, P136).

Artificial intelligence and its diverse applications enable smart libraries to possess unique features, serving as intelligent entities to manage these libraries, their structures, services, devices, furniture, and utilized systems. This contributes to developing the skills of the smart office in providing efficient services and meeting the needs of the intelligent beneficiary

3. Using the Internet of Things:

The Internet of Things is defined as the global information architecture representing and providing a technological infrastructure to facilitate reliable service

exchange (mahidi& Fernan, p275).

The Internet of Things can be leveraged in libraries by facilitating the work of information specialists in identifying physical items in libraries, providing information about traditional collections, and making them available online. It also enables the development of innovative business models and the organization of library activities and events.

4. Using a robot:

I am interested in simulating the motor and verbal processes performed by humans or animals in general. My focus is on developing mechanisms and technologies that enable machines to perform repetitive or hazardous activities, to relieve humans from these tasks. This includes file sorting, conducting cleaning operations, facility surveillance, even fetching books from shelves, and many other tasks. This allows for a focus on the most repetitive activities, thereby improving work efficiency and saving time and effort (Abdennour,2005 , p.p79-81).

2.3. Possibilities and Means of Utilizing Artificial Intelligence Applications in University Libraries:

Artificial intelligence applications are vital tools in improving the performance and services of university libraries. To benefit from these applications, a wide range of means and tools must be utilized to enhance user service and improve information management. Among the most prominent means and tools for employing artificial intelligence applications in university libraries, according to the opinions of researchers:

The study results show that 40.47% of participants believe that providing the institution with the technological infrastructure to host artificial intelligence applications is necessary. In the context of organizational and legislative framework flexibility, 26.19% express that this flexibility is important with technological advancements. Additionally, 21.42% of participants see the importance of providing and developing information specialist skills to use modern technologies, while 11.90%

emphasize the importance of aligning artificial intelligence applications with the goals and vision of strategic institutions.

3. RESULTS AND DISCUSSION

3.1. The Role of Artificial Intelligence Applications in Governing University Library Services:

Artificial intelligence applications are among the modern technologies that generate significant interest in the field of governing university library services. Artificial intelligence enables the smart utilization and analysis of data, thereby improving management efficiency and enhancing the services provided by libraries. In this context, the role of artificial intelligence applications in enhancing the governance of university library services comes in various ways, including:

3.1.1.The Role of Artificial Intelligence Applications in Information Sources Processing:

Understanding the role of artificial intelligence applications in processing information sources contributes to analyzing data faster and more accurately, reducing the human effort required to extract important information.

The study results expressed in Table 06 indicate that 24.28% perceive the importance of analyzing large amounts of data quickly and effectively. Additionally, 21.42% consider improving the accuracy of automated indexing of diverse sources as important, while 18.57% point out the importance of enhancing information classification and organization processes. Moreover, 15.71% highlight the importance of intelligently analyzing document content to understand topics, and 12.85% consider understanding natural language and enhancing information retrieval and extraction as crucial. Furthermore, 7.14% emphasize the importance of automatically analyzing text content.

3.1.2. The Role of Artificial Intelligence Applications in Information Access Governance: The role of artificial intelligence applications in governing information access pertains to how data and information are accessed, permissions granted, and control exercised. Artificial intelligence seeks to improve this process by providing technological solutions that integrate smart data analysis and intelligent machine applications.

The obtained results reveal a set of measures and policies adopted to facilitate the governance of information access through the use of artificial intelligence applications in university libraries. A percentage of 16.66% indicates intelligent data classification according to specific criteria, emphasizing the importance of smart data classification for better content understanding and organization to enhance system effectiveness. Additionally, 33.33% express the importance of confirming user identities and implementing effective identity verification systems, enhancing protection and reducing unauthorized access risks.

The surveyed sample also expressed encouragement for researchers and diversifying research methods by 26.19%, highlighting the importance of promoting research diversity to better leverage artificial intelligence applications in the academic field. Document management and facilitating user access governance accounted for 23.80%, emphasizing the importance of effective document management and access governance organization.

These results demonstrate awareness of the importance of taking effective measures to enhance information access governance through artificial intelligence applications in the academic context.

3.1.3. Outputs of governance of university library services in the context of artificial intelligence applications:

Understanding the outputs of governance of university library services is essential to comprehend how these applications can contribute to improving service delivery and enhancing user service. According to researchers in the context of artificial intelligence

applications, the obtained results demonstrate the prominent impact of governance of university library services. The results indicate diverse directions for improving library services, reflecting responsiveness to the needs and aspirations of users with a particular focus on information security and community interaction.

The study sample expressed enhancement of interaction with users by 23.07%, indicating the importance of building strong interactive relationships with the academic community. Regarding the selected response option, enhancing information security and threat detection was expressed by 26.15%, which is essential in the digital age and electronic information exchange, given the significant interest and increasing focus on information security and protection. Additionally, 13.84% expressed the importance of analyzing and effectively using data to benefit from the vast information horizon and improve services based on modern insights. Furthermore, 10.76% expressed the need for providing tailored and effective services, indicating the necessity to effectively meet user needs and provide customized services to ensure satisfaction and efficiency, Moreover, 16.92% expressed providing audiovisual content about library services, indicating responsiveness to the expectations of users who utilize various media. Regarding improving administrative efficiency, this was expressed by 9.23%, indicating the need to enhance internal processes and increase efficiency in library management.

3.2. Challenges and difficulties in employing artificial intelligence applications in governing university library services:

The utilization of artificial intelligence applications in governing university library services faces organizational, technological, and administrative challenges and difficulties that hinder the full utilization of its capabilities. The most prominent of these challenges and difficulties include:

3.2.1. Legal, legislative, and regulatory challenges: Legal, legislative, and regulatory challenges in the field of university library services pose significant obstacles. This aspect of challenges generally arises due to rapid developments in technology and the increasing need to update laws and regulations to ensure the safety and security of these applications, The results regarding legislative challenges hindering the deployment of artificial intelligence applications in governing university library services indicate several key issues. The study sample expressed dissatisfaction with the lack of renewal of legislation related to digital rights protection, with a percentage of 24.19%. This highlights a significant challenge concerning the renewal of legislation related to digital rights protection, which poses a major obstacle to using smart technology to improve library services.

Additionally, the absence of regulations governing electronic work in university libraries was expressed by 37.09% of the respondents. This absence leads to the lack of a legal framework to mitigate breaches and ensure security and privacy. Furthermore, 20.96% of respondents indicated that existing legislation and laws do not assist in deploying artificial intelligence applications in governing university libraries, suggesting that current laws may not be suitable for this purpose.

Finally, the challenge of employee compliance with laws was expressed by 17.74% of the study sample.

3.2.2. Human Resources and Challenges in Deploying Artificial Intelligence Applications in Governing University Libraries:

The human aspect in improving the deployment of artificial intelligence applications in governing university library services presents significant challenges that necessitate attention to human resources in terms of training and awareness.

According to the results, one of the most prominent challenges related to human resources is the lack of awareness of the importance of artificial intelligence applications, expressed by 17.10% of the study sample. This challenge underscores the importance of educating employees about the benefits and impact of artificial

intelligence applications in enhancing library services, which requires efforts to enhance awareness and understanding of the potential benefits.

The study sample also expressed a lack of knowledge about how to deploy artificial intelligence applications, with a percentage of 25%, highlighting the importance of providing training and support to employees on how to effectively deploy and use artificial intelligence applications in the context of university libraries. Furthermore, the sample indicated the absence of training programs on artificial intelligence applications by 30.26%, reflecting a deficiency in dedicated training programs that provide the skills and knowledge necessary for employees to understand and use artificial intelligence applications.

Regarding the lack of adoption of a culture of innovation and modern technology, it was expressed by 9.21% of the respondents, encouraging the use of modern technology such as artificial intelligence applications.

Lastly, the option related to the lack of technological skills and competencies was expressed by 18.42% of the study sample, indicating the need for measures to develop and enhance their capabilities in the field of information technology.

3.2.3. Challenges Related to University Library Budgets:

As university libraries increasingly rely on artificial intelligence applications, a significant challenge arises regarding the budget allocation for employing these applications. Considering the importance of employing various technologies in libraries, this aspect must be taken into account.

The study findings lead to the conclusion that the most significant challenges facing the deployment of artificial intelligence applications in governing university library services are related to costs. The study community expressed concerns about infrastructure costs, accounting for 41.50%, reflecting the substantial challenge regarding the significant investments required by universities to build the necessary infrastructure for implementing artificial intelligence applications.

Regarding installation and operation costs, the response rate was 24.52%, highlighting the importance of considering the costs associated with installing and operating these applications, including integration with existing systems.

The study community also emphasized training costs at 13.20%, indicating the importance of training costs to ensure that employees have the necessary skills to effectively deal with artificial intelligence applications.

The need to ensure maintenance costs was expressed by 7.54%, highlighting the necessity of considering periodic maintenance costs to ensure the effective and reliable performance of artificial intelligence applications.

Additionally, 13.20% of the study sample indicated concerns about technological vigilance costs, underscoring the importance of continuously monitoring technological advancements and continuously updating and developing applications to keep pace with developments in this field.

4. Study Results:

- Researchers in library and information science at the Algerian University have limited awareness of the concept of artificial intelligence, as indicated by 40.47% expressing that artificial intelligence relates to systems' ability to efficiently execute tasks and achieve goals intelligently.

- The surveyed sample expressed the most important applications that can be employed in university libraries as the Internet of Things applications like RFID location tracking system at 38.18%, as it is an effective technology in locating various services provided to beneficiaries.

- Among the most prominent means and tools for employing artificial intelligence applications in university libraries, according to researchers' opinions, is the provision by the institution of technological infrastructure to host artificial intelligence applications, as indicated by 40.47%, which is essential.

- Artificial intelligence applications contribute to processing information sources by analyzing data faster and more accurately, as indicated by 24.28% of respondents,

and governing user access to information at 23.80%, confirming the importance of effective document management and access governance.

- The most significant challenges hindering the deployment of artificial intelligence applications include the absence of legislation and regulations governing electronic work in university libraries, expressed by 37.09%.

- The absence of training programs related to artificial intelligence applications, at 30.26%, reflects the lack of skills and knowledge necessary for employees to understand and use artificial intelligence applications in university libraries.

5. CONCLUSION

Through the study, it is clear that deploying artificial intelligence applications in governing university libraries represents a significant shift towards improving service efficiency and facilitating access to information sources, despite organizational, financial, and technical challenges. The role of artificial intelligence applications in enhancing beneficiary service and bolstering library management is highlighted by providing necessary budgets and continuously updating human resources, thereby contributing to effectively achieving library objectives. Additionally, vigilance and focus on technological advancements and innovation are required, which contributes to providing added value to the academic community.

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