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The Information Retrieval Systems of Public Libraries: Contemporary Problems and Perspectives

Abstract

The article explores the role, application, and development challenges of information retrieval systems (IRS) in public libraries. It analyzes the impact of these systems on the quality of library and information services and identifies technological, methodological, and organizational difficulties. The author emphasizes the importance of localizing IRS, creating a unified national platform, applying artificial intelligence technologies, and adopting user-centered approaches. Additionally, the significance of staff training, government support, and public awareness is highlighted. The article proposes that the effective implementation of IRS will accelerate the digital transformation of public libraries and enhance their strategic importance in the information society.

Keywords: Public libraries, Information Retrieval Systems, Digital Transformation, Library and Information Services, Artificial Intelligence

Kamu Kütüphanelerinin Bilgi Erişim Sistemleri: Güncel Sorunlar ve Perspektifler

Öz

Bu makale, kamu kütüphanelerinde bilgi erişim sistemlerinin (IRS) rolü, uygulaması ve geliştirilmesindeki zorlukları incelemektedir. Makale, bu sistemlerin kütüphane ve bilgi hizmetlerinin kalitesi üzerindeki etkisini analiz etmekte ve teknolojik, metodolojik ve organizasyonel zorlukları



belirlemektedir. Yazar, IRS'nin yerelleştirilmesinin, ulusal bir platformun oluşturulmasının, yapay zeka teknolojilerinin uygulanmasının ve kullanıcı odaklı yaklaşımların benimsenmesinin önemini vurgulamaktadır. Ayrıca, personel eğitiminin, hükümet desteğinin ve kamuoyunun farkındalığının önemi de vurgulanmaktadır. Makale, IRS'nin etkili bir şekilde uygulanmasının kamu kütüphanelerinin dijital dönüşümünü hızlandıracağını ve bilgi toplumunda stratejik önemini artıracağını öne sürmektedir.

Anahtar kelimeler: Kamu kütüphaneleri, Bilgi Erişim Sistemleri, Dijital Dönüşüm, Kütüphane ve Bilgi Hizmetleri, Yapay Zeka

Introduction

In the modern era, the concept of the information society holds a significant place in scientific and social discourse. One of the main characteristics of this society is that the processes of acquiring, processing, and sharing knowledge have become central functions. In this regard, the effective management of information resources and their prompt delivery to users are of great importance. As one of the fundamental institutions of the information society, public libraries serve as cultural and educational centers that provide open, equal, and free access to information for all members of society. The information retrieval systems (IRS) of these libraries are among the key mechanisms that determine their functionality and usability. Information retrieval systems (IRS) enable users to search among extensive information resources, obtain data that meets their needs, and use this information effectively. Over the past decades, technological innovations, digitization processes, and changing user demands have made the development of IRS indispensable. However, alongside this development, various problems have emerged, including software deficiencies, language barriers, management of unstructured data, shortage of professional staff, and financial constraints. The aim of this article is to analyze the current state of information retrieval systems in public libraries, identify existing problems, and propose solutions. Based on both local and international experiences, the article will explore prospective directions for the development of Azerbaijan's library system.

1. Main Part

*Functions of Public Libraries and Their Role in the Information Society

Public libraries have historically played an important role in the education of the population, meeting information needs, and the development of cultural life. They are open and democratic institutions serving users from various social strata, age groups, and areas of interest. With the formation of the information society, the functions of public libraries have expanded, and their traditional service areas have been enriched with digital and interactive formats.

*Traditional Functions and Service Areas

Among the main functions of public libraries are:

- Education and information provision: Libraries provide users with the necessary resources for education, self-development, and professional activities (Ismayilov, Ismayilov & Mammadova, 2019).
- Preservation and dissemination of culture: Preserving written heritage and promoting national and universal cultural examples are among the key responsibilities of libraries.
- Effective organization of leisure time: Through exhibitions, lectures, reading days, and other events, libraries become centers of social life (Mammadov, 2022b).
- *Transformation of Libraries in the Information Society

One of the key features of the 21st-century information society is the rapid renewal of knowledge and digitalization of information (Muhammadli, 2023). In this context, the functions of public libraries have changed, and the following new directions have come to the fore:

- *Digital information services:* Electronic catalogs, digital archives, open-access resources, and online databases are provided to users (Ismayilov, 2022; Ismayilov & Khalafova, 2023).
- Development of information literacy: Libraries organize training sessions to teach users skills for searching, evaluating, and using information.
- Creation of virtual spaces: Library services extend beyond physical locations through digital platforms, reaching global audiences (Qasımlı & Məhəmmədli, 2024a).
- *Increasing social inclusivity:* Special resources and services are created for people with disabilities, the elderly, and socially vulnerable groups.
- *Changing Profile of the Modern Library User

The new generation of users is familiar with information technologies, expects fast and high-quality access to information, and demands services tailored to their individual needs. This requires libraries to have more flexible, interactive, and technologically equipped service mechanisms (Məhəmmədli, 2024). Traditional card catalogs are no longer sufficient—users want to search through information retrieval systems, filter results, download, and share texts.

*Social and Democratic Functions of Public Libraries

Libraries are not only sources of information but also means of social integration (Nadir & Sevda, 2022). They promote public participation, education, and the dissemination of democratic

values (Ismayilov & Aliyeva, 2023; Ismayilov & Khalafova, 2022b). These functions become even more relevant in the information society, strengthening the social role of libraries.

*Essence and Development Stages of Information Retrieval Systems

Information retrieval systems (IRS) are a set of technical and methodological tools designed to meet users' specific information needs within a broad information environment (Mammadov, 2013). These systems enable users in libraries to find the information they seek accurately, efficiently, and promptly. IRS continuously improve in response to the demands of the information society and have become a leading component of digitalization processes.

*Concept and Functional Components of IRS

Information retrieval systems consist of the following main components:

- *Information database*: This stores the library's information resources (catalog records, articles, books, archival documents, etc.) (İsmayılov, Mahammadli & Gasimli, 2023a).
- *Indexing and classification mechanism:* Used for structuring and systematically presenting information (UDC, alphabetical catalogs, etc.).
- *User interface:* The visual and functional platform that facilitates user interaction with the system (web-based search windows, mobile applications).
- Search algorithms: Ensure filtering and presentation of data based on user queries.
- *Communication and interoperability functions:* Enable integration with other systems and databases (Z39.50 protocol, OAI-PMH, etc.).
- *Historical Development Stages of Information Retrieval Systems (IRS)

The development of information retrieval systems can be divided into several stages:

- a) *Traditional (manual) stage:* During this period, searches were conducted manually using card catalogs, bookmarks, and indexed journals. This method was very labor-intensive and time-consuming.
- b) *Automated stage (1970–1990):* Initial automation based mainly on local computer systems occurred. Electronic catalogs and simple databases were implemented. The MARC format became widely adopted.
- c) *Digital stage (1990–2010):* With the spread of the Internet, electronic catalogs migrated to online platforms. OPAC systems (Online Public Access Catalog) were developed. Search systems became more dynamic and interactive (Ismayilov, Mahammadli & Khudiyeva, 2022).

d) *Innovative stage (2010–present):* This stage is characterized by the application of artificial intelligence algorithms, semantic search, natural language processing (NLP), and recommendation systems tailored to user behavior. Mobile and cloud-based library systems have become popular (Kushzhanov & Dashgin, 2019c).

*Classification of IRS

Information retrieval systems can be classified according to the following criteria:

- By coverage: Local (within the library), national, international (Ismayilov & Khalafova, 2022a).
- By interface language: Monolingual and multilingual.
- By technology: Traditional (OPAC-based), web-based, mobile-adaptive, AI-based (Ismayılov & Khudiyeva, 2023; Khalafova & Ismailov, 2024).
- By level of integration: Isolated or integrated with other systems.
- *Modern Trends in IRS:
- Union catalog systems (Rzayeva, 2020).
- Automatic generation of bibliographic data
- Real-time search and query-response systems (Qasımlı & Məhəmmədli, 2024b).
- Personalized interfaces and recommendation systems (Rzayeva, 2024).
- Integration with social media and user reviews
- *Application of Information Retrieval Systems in Public Libraries

At the modern stage of public library activity, the application of information retrieval systems has become a necessary and inevitable process (Askerova & Mammadov, 2025). Through these systems, libraries offer their resources to a wider audience and provide users with flexibility and convenience in obtaining information. Effective use of IRS improves the quality of library services, increases user satisfaction, and overall enables libraries to fulfill their societal functions more fully (İsmayılov & Məhəmmədli, 2024).

- *Application Areas and Functional Capabilities of IRS in Public Libraries
- *Management of electronic catalogs:* Presenting books, articles, dissertations, and other information carriers in electronic catalog format to users.
- Remote access to resources: Readers can browse and query library collections from home or other locations (Kushzhanov & Dashqin, 2019a).

- Structuring data and semantic search: Resources are systematized by subject, author, publication year, keywords, and other criteria. (Mahammadi, 2024).
- Online ordering and reservation functions: Readers can search, find, order, or reserve books online (Kazimi, Ismaylov, Rzayova, 2023).
 - *Interactive user services:* User registration in the system, creation of personal accounts, management of reading history, reviews, and rating capabilities.
- *Main Technological Platforms in the Application of Information Retrieval Systems (IRS) and Their Use in Public Libraries

Leading software solutions:

- *Koha:* Open-source, widely used international library management system.
- Evergreen: Popular in North America, flexible and scalable platform.
- Aleph and Alma (Ex Libris): Mainly used by large scientific and academic libraries, also implemented in some public libraries (Balayeva, 2025).
- *LIBSYS and SLIM*++: Applied in India and Southeast Asia (Karabalina, Maydangalieva, Satygalieva, Ahmetalina, & Mahammadli, 2018).
- Example from Azerbaijan: The National Library's electronic catalog, online systems of the Republic Children's Library, and regional library platforms.
- *Benefits of IRS implementation
- Online search and ordering without physical visits (Tofiq, Oqlu & Kazimi, 2022).
- Automation of book circulation, inventory, and statistics.
- User-centered personalized services.
- Saving time for staff and users (Rzavva, 2023).
 - *Key Challenges Encountered Technological problems:
 - Insufficient infrastructure (servers, internet).
 - Software not adapted to the Azerbaijani language.
 - Weak integration of systems (Kazimi & Mahammadli, 2021).
 - Cybersecurity risks (Heydar, 2023).
 - *Methodological problems:
 - Lack of support for semantic search and natural language queries.
 - Absence of standardization and unified methodology.
 - Insufficient training for users and librarians (Rzayeva, 2025).

- *Organizational problems:
- Financial constraints (Ismayilov, Mahammadli & Gasimli, 2023b).
- Shortage of qualified personnel and lack of professional development.
- Weak strategic vision in leadership.
- Poor public relations management (Ismailov & Bayramova, 2022b).
- *Region-specific problems:
- Gas and electricity outages (Bayramov & Məhəmmədli, 2025).
- Language barriers (ethnic minorities).
- Low public interest in libraries (Mammadov, 2022a).
- *Contemporary Problems: Technological, Methodological, and Organizational Aspects

For effective functioning of IRS, it is necessary to strengthen technological infrastructure, localize software, establish a unified national network, implement cybersecurity measures, improve methodological approaches, and increase training (Kenzhebayeva, Urmurzina & Mahammadli, 2018). Organizationally, financial support, personnel training, and strategic management are essential.

- *Development Perspectives of Information Retrieval Systems
- Artificial intelligence and machine learning: Semantic search, recommendation algorithms, voice and natural language queries.
- Cloud technologies and unified national platform
 Cloud-based systems, unified national electronic catalog (Union OPAC), centralized indexing (Balginova, Maydangalieva, Satygalieva & Mahammadli, 2018).
- Application and localization of open-source platforms

 Adaptation of platforms like Koha and Evergreen to the Azerbaijani language.
- Mobile compatibility and multichannel user interface
 Mobile apps, SMS, social media, and bots for queries (Alekper & Tofig, 2020).
- *User-oriented design and public participation*Comment and rating systems, social integration.
- Role of IRS in digital education environments

 E-book platforms, collaboration with educational institutions, indexing virtual teaching resources (Kazimi & Balayeva, 2024).
- Government support and national strategies

Importance of IRS in national information policy, innovation grants, personnel training programs, and promotion of local technologies.

This text systematically covers the key aspects of the application and development of information retrieval systems in library management.

Conclusion

The implementation and development of information retrieval systems (IRS) in public libraries redefine their role in the modern information society. These systems enable library services to be flexible, functional, and user-oriented. However, problems at technological, methodological, and organizational levels limit the effectiveness of these systems and hinder their sustainable development. Research shows that although significant steps have been taken in Azerbaijan towards the implementation of IRS, a more systematic and strategic approach is still required in this field. In particular, infrastructure and staffing issues persist in regional libraries, while analysis of user needs and system design remain secondary priorities. IRS should be understood not only as technological innovations but also as a qualitative change in the philosophy of service.

*Creation of a National Unified IRS Platform: A centralized electronic catalog system uniting the resources of all public libraries should be established (Kushzhanov & Dashgin, 2019a).

*Localization and Support of Software: Open-source systems must be adapted to the Azerbaijani language, and their technical and methodological support ensured.

*Expansion of Training and Professional Development Programs: Regular advanced training courses in information technology and IRS should be organized for library staff.

*Application of User-Oriented Design Principles: Search systems should be easy to use, visually attractive, and provide personalized services.

*Increase in Funding and Government Support: State funding allocated for the digital transformation of libraries should be increased, and cooperation with donors and partner organizations expanded (Kushzhanov & Mahammadli, 2019b).

*Public Relations and Awareness Raising: Users should be informed about the capabilities of IRS, and educational campaigns should be conducted through social media and mass media.

*Application of Artificial Intelligence and Automation Tools:

The use of intelligent algorithms, recommendation systems, and automatic indexing technologies in the search process should be increased (Mahamadli, 2018). In conclusion, the

improvement of public libraries' functions through information retrieval systems will enrich them with new content and turn them into one of the main institutions of the digital information society. This can be achieved with both government policy and public awareness support.

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