

Automated Library Management Systems: International Standards for Selecting Automated Systems in Academic Libraries

الأنظمة الآلية لإدارة المكتبات: المعايير العالمية لانتقاء الأنظمة الآلية في المكتبات الجامعية

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ABSTRACT:

Libraries and information institutions, like other organizations, are undergoing rapid transformations aimed at enhancing their services through the integration of modern technologies that improve professional performance and increase the efficiency of information retrieval. A critical stage in this development is the careful evaluation of automated systems adopted to manage and deliver services to users. Such systems create a positive impression of the technical quality of services, strengthen the interaction between staff and users, and contribute to higher levels of user satisfaction by adhering to unified standards. Automated systems in libraries have become an inevitable choice to cope with the exponential growth of information and to organize scientific knowledge, facilitating easier and more cost-effective access and retrieval. Consequently, they contribute to elevating technical and professional practices within libraries.

Keywords: Library Management, Automated Systems, Information Retrieval, Academic Libraries, Library Services.

الملخص:

أصبحت المكتبات والمؤسسات الوثائقية كغيرها من المؤسسات تسعى إلى الرفع من خدماتها وذلك لن يكون إلا بإدماج التكنولوجيات الحديثة التي تساهم في الرفع من الأداء المهني والارتقاء بمستوى الاسترجاع المعلوماتي. إن من أهم المراحل التي تمر بها المكتبات والمؤسسات الوثائقية في تطوير عملها هو النظر العميق في الأنظمة الآلية التي تدمجها في تسيير خدماتها وإخراجها للمستفيدين كحلقة نهائية التي تعطيه الانطباع الإيجابي لمسيرة الاستفادة من النشاط التقني الذي يفرض نفسه على مستوى الأداء من طرف العاملين مما يجسد علاقة وطيدة بين المستفيدين والعاملين وذلك نتيجة النظام المعياري الذي أفرز جملة من التطورات في اكتساب رضا المستفيدين. تعتبر الأنظمة الآلية المدمجة في المكتبات نتيجة حتمية في مساندة الكم المعلوماتي وتطبيق المعرفة العلمية لتسهيل الوصول إليها واسترجاعها بطرق بحثية سهلة وبأقل التكاليف وبالتالي الرقي بالعمل الفني داخل المكتبات. كلمات مفتاحية: الاسترجاع المعلوماتي، خدمات المكتبات، المكتبات الأكاديمية.

1- Introduction:

Libraries have witnessed remarkable progress in the integration of technologies and automated systems, coinciding with the vast expansion of information and the accelerating pace of publication. To manage this tremendous flow, libraries have been compelled to keep pace with modern civilization and align themselves with contemporary aspirations.

Libraries constantly strive to improve the quality of their services, which depends on various operational factors. Each activity is prioritized according to its significance, with the aim of offering

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users a qualitative experience when interacting with automated systems such as online catalogs, portals, and other digital service outputs.

2- Automated Systems in Libraries:

Automated systems began to be used in libraries as a result of the numerous challenges associated with manual systems, the diversity and volume of intellectual production, and the rapid pace of technological development. Since library operations essentially depend on the speed and accuracy of information recording, organization, and dissemination, many procedures can be subjected to automation. Consequently, the automated system serves as an effective assistant in carrying out the library's functions (Clayton, 1992).

An information system is defined as a framework that ensures the harmonious interaction of inputs (such as data, information, and documents) with software, hardware, and trained human expertise to guarantee control over the flow of information and to meet the information and service needs of a specific community (Aman & Yasser, 1998).

The technical and professional work within libraries, through the integration of modern technologies and automated systems, offers numerous advantages. In this research, I seek to highlight two key concepts due to their importance strategy and technology.

The first term, strategy, refers to the need to provide all necessary mechanisms, tools, and specialized equipment to achieve the intended goal of keeping pace with contemporary developments whether in terms of software or advanced scientific devices, regardless of cost or software version.

The second term, technology, relates to the technical work performed by system analysts and operational support teams, ensuring uninterrupted functioning of systems. This can only be achieved through the presence of skilled technical staff who continuously monitor and manage all operational processes.

3- The Evolution of Automated Systems in Libraries:

The automation systems used in libraries have undergone several distinct phases since their inception and development. These stages can be summarized as follows:

First Phase:

This stage began in the 1930s, with the use of punched cards, which were designed to store machine-readable information for specific library operations such as circulation or acquisitions, independent of other library functions (Abdel Hadi, 1995).

Second Phase:

Emerging in the late 1960s and early 1970s, this stage marked the application of automated systems in one or more library activities and the appearance of companies specialized in developing library automation systems (Al-Tayyar, 2005).

Third Phase:

Beginning in the early 1980s, this phase witnessed the implementation of integrated library systems (ILS). These systems improved significantly in processing speed, functional diversity, and

performance capabilities, alongside tremendous advancements in hardware, software, telecommunications, and networking technologies (Sameh Zainhum, 2004).

Fourth Phase:

This stage introduced interconnected integrated library systems, resulting from the development of communication technologies and network infrastructures. The evolution of Internet-based applications enabled collaborative work and shared system usage among libraries, as well as enhanced interaction through web pages aligned with the principles of the Semantic Web (Aman & Yasser, 1998).

4- Types of Automated Systems in Libraries:

Automated systems available for libraries and information centers vary widely. These systems are distinguished by their design, suitability to user needs, and the level of technical support provided by their vendors. According to (Omnia & Al-Naqeeb, 2003), library automation systems can be classified as follows:

4-1- Non-Integrated Systems:

Non-integrated systems are characterized by separate databases and independent design structures for each department or library function. Each subsystem operates autonomously for example, an individual subsystem for cataloging, another for serials management, and another for acquisitions. Even within one subsystem, databases might be further divided (e.g., separate databases for books, references, and theses) (Aman & Yasser, 1998).

4-2- Integrated Systems:

There are numerous definitions for Integrated Library Systems (ILS). One such definition describes them as:

“A system in which all modules share a single database and a unified command language, such that changes in one module are instantly reflected across all other modules.” (Aman & Yasser, 1998)

Integrated systems can also be viewed as a unified database or a set of distributed files that are merged to appear as one cohesive structure, eliminating unnecessary data duplication (Abdel Hadi, 1995).

5- Mechanisms and Methods for Acquiring Integrated Library Systems:

Libraries and information centers have several approaches available for acquiring integrated library systems (ILS) to automate their core functions and establish comprehensive automated environments.

At first glance, purchasing a commercial integrated system may appear costly. Many libraries and information centers lack the financial resources to acquire such systems due to their high costs and the need for highly skilled technical staff for operation, maintenance, and system development. Consequently, many libraries have turned to building their own automated systems, as it is commonly believed that developing a local system is less expensive than purchasing a commercial one even in the era of globalization and declining costs of hardware and software licenses.

However, it has been observed that many Arab libraries have developed local systems that are non-standardized, leading to their failure in fulfilling intended tasks. This is because designing a standardized integrated system requires specialized expertise in both library science and advanced programming.

The main criterion for classifying a system as closed, non-integrated, integrated, or open lies in the nature of its interaction with the surrounding environment and the degree of functional communication between its subsystems.

6- Advantages of Automated Systems:

Effective utilization of automated systems in libraries yields several significant benefits, including:

6-1- Bibliographic control:

Automated bibliographic tools facilitate the management of the growing publishing market by helping libraries select materials that closely match user interests.

6-2- Enhanced technical operations:

Automation improves cataloging, classification, and subject analysis processes through the use of computerized cataloging rules, classification schedules, and subject heading lists. Libraries can also subscribe to machine-readable cataloging services (MARC) provided by bibliographic data centers via CD-ROMs or online services.

6-3- Optimal human resource utilization:

Integrated systems improve staff productivity, save physical space through the use of digital information resources instead of print materials, and provide remote access to automated catalogs with multi-point search and retrieval functionalities.

7- Fundamentals and Criteria for Selecting Library Automation Systems:

The acquisition of an automated library system generally takes one of the following three forms, depending on institutional needs and priorities:

- Acquisition of individual modules according to specific functions or objectives.
- Acquisition of a fully integrated system.
- Acquisition of a hybrid system, combining modules from different systems.

Regardless of the selected approach, it is essential that the system meet certain general and specific requirements, including:

7-1- General Requirements:

- Openness The ability to import and export bibliographic data according to international standards and formats, and support for Internet/Intranet interfaces with hypertext navigation.
- Compliance with international standards such as Z39.50 and ISO 2709.

- Ease of use, including flexible parameter settings, user-friendly windows, and online help functionality.
- Use of a recognized and efficient database management system (DBMS) capable of handling multiple databases and cross-indexing files.

7-2- Specific Requirements:

Each module has distinct characteristics and functionalities.

7-2-1- Acquisition Module:

Key functions include:

- Management of orders, suppliers, and user data.
- Retrieval of bibliographic data for desired documents from commercial databases on CD-ROMs or online platforms.
- Electronic ordering through e-mail.
- Supplier database management and order tracking.

7-2-2- Circulation Module:

This is among the most critical modules as it directly relates to user services. It enables automated linkage between the bibliographic (or item) database and the borrower database. Although often implemented after the cataloging phase, it should include features such as:

- Customizable loan policies by user type, loan duration, and document limits.
- Registration, editing, and tracking of borrower records.
- Check-in/check-out operations, renewals, and reservations.
- Identification of item status (e.g., checked out, reserved, under binding, etc.).
- Generation of circulation statistics by document type and user category.
- Support for interlibrary loan (ILL) and network-based cooperation among libraries.

7-3- Necessary Equipment:

It is advisable to acquire equipment that supports future scalability of the system, particularly in terms of computing capacity (RAM, hard drive, processor). Essential equipment includes:

- High-performance computers.
- Electrical protection devices such as uninterruptible power supplies (UPS) and voltage regulators.
- Suitable printers according to operational needs.
- Updated software applications and operating systems to ensure file compatibility and interoperability.

In today's world, modern users demand rapid access to information for decision-making and daily operations. The defining strength of computer-based systems lies in their speed and efficiency in processing and retrieving information. Consequently, libraries must adopt automated systems to enhance the dynamism and responsiveness of their operations. These systems play a vital role in overcoming the challenges and constraints of traditional library management practices.

8- Examples of Automated Systems for Library Management:

The process of designing and developing information systems requires individuals with high-level skills and competencies who can understand existing system problems and propose optimal solutions.

Before designing a new system, it is necessary to analyze the current system, identify its components, define its problems, goals, and functions, and determine its user base.

Automated library management systems vary in type and efficiency depending on how their modules interact during service operations and how data files are exchanged between devices.

Among the most well-known systems are the following:

8-1- Horizon System:

Horizon is an automated integrated library system (ILS) with multiple versions released since 2004. It provides comprehensive modules that cover all administrative and technical operations within libraries and information centers.

- Its circulation module manages all loan-related functions, including:
- Adding borrower records.
- Registering loan transactions, renewals, and book returns.
- Linking all operations to the library's circulation policies.
- Compatibility with e-mail systems for notifications.
- Setting loan periods and issuing overdue alerts.
- Generating daily, monthly, or on-demand reports on all circulation activities.

8-2- INNOPAC System:

Developed by Innovative Interfaces Inc. (founded in 1978), this company is among the leading global providers of integrated library systems. Since its inception, the company has specialized in designing user interfaces. One of its earliest achievements was the CLSI acquisitions interface, used for transferring records from the OCLC system enabling seamless record migration between platforms.

In 1989, the company released INNOVAQ, a turnkey system for acquisitions and serials control, designed to operate on midrange computers.

By the mid-1980s, INNOPAC emerged as the first fully integrated library system, allowing libraries to use either all modules or select specific applications as needed.

In 1996, the company announced a new generation of its products under the name INNOPAC/Millennium, officially launched in 1997, offering multiple economic options suitable for various types of libraries.

8-3- VTLS System:

The VTLS (Virginia Tech Library System) was developed in the 1970s by the Virginia Polytechnic Institute and State University.

The institution expanded its research projects by partnering with a network of libraries, scientific organizations, and academic institutions. This collaboration evolved into a large-scale organization and network focused on the development of advanced library software and services for its members and subscribers.

8-4 M2L (MINISIS Management for Libraries) System:

Although relatively old, M2L (MINISIS Management for Libraries) gained wide recognition after its 2003 release.

The system manages documents throughout their entire lifecycle, from acquisition to user request.

Its major functional modules include:

Bibliographic data management

- Acquisitions
- Circulation
- Inventory control
- Online public access catalog (OPAC)

8-5- Amlib System:

Amlib is a flexible automated system designed for various types of libraries, supporting a wide range of modules for cataloging, circulation, and acquisitions.

8-6- Unicorn System:

Unicorn, developed by SirsiDynix, is recognized as the second most widely used integrated library system in the world, following Horizon. It provides extensive functionality across cataloging, serials control, circulation, and reporting.

8-7- Biblioscope System:

Biblioscope is a specialized program for bibliographic management and reference list creation. It enables users to organize, cite, and manage bibliographies efficiently, particularly useful in academic and research environments.

8-8- PMB (PhpMyBibli) System:

- PMB is a free, open-source integrated library system designed for complete library automation.
- It fully complies with international library standards, such as UNIMARC, and can operate both standalone or within a client-server network
- It is compatible with multiple operating systems, including Windows, Linux, and MacOS.
- A practical example of cataloging and indexing in the PMB system involves the creation and management of bibliographic records for books, enabling efficient retrieval and digital access through the system's integrated catalog interface.

Step 1: Cataloging the Book

Navigate to the "Catalogue" tab, then select "Nouvelle notice" (New Record) to create a new bibliographic entry.

Enter the book's ISBN or EAN number, then click on the "Suivant" (Next) button to proceed. Choose the type of document, for example: "Texte imprimé" (Printed text).

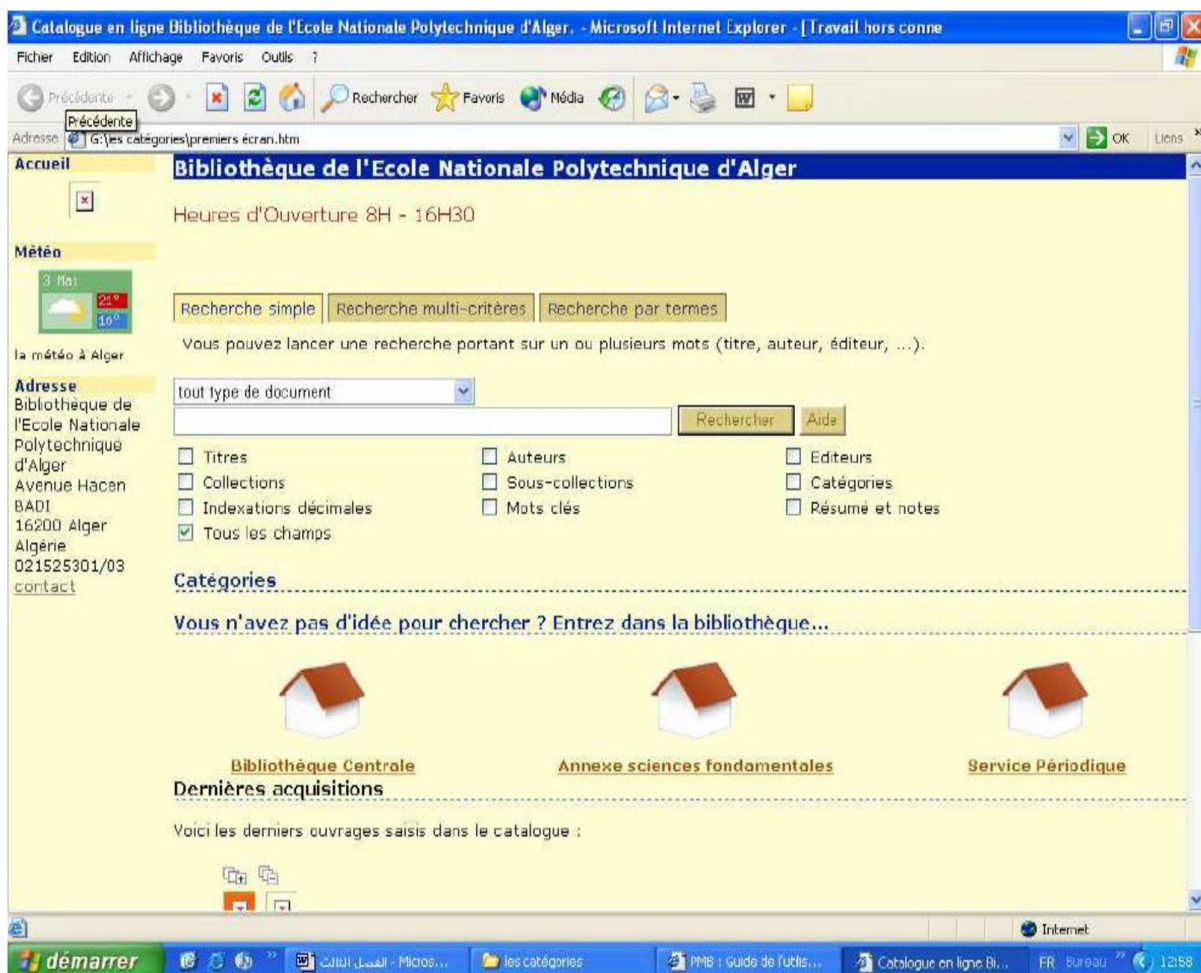


Fig.1. Cataloging the Book

A. Title Information:

When entering the title data, begin with the following fields:

Main Title: The primary title of the book, as it appears on the title page.

Parallel Title: The title of the book presented in another language.

Subtitle or Complementary Title:

The secondary or subordinate title that provides additional information about the main title.

B: Authorship Information:

- Main Author: Selected from the list of existing authors or added manually using Add an author.
- Author Function: Indicates the author's role, such as Author.
- Co-author: Added in the same way; represents the second author of the work.
- Secondary Author(s): Added similarly to specify contributors other than the main author, such as translators, editors, illustrators, or preface writers.

- Secondary Author Function: Specifies the role for example: Author, Translator, Preface Writer, Illustrator.

C. Publication and Series Information:

- Publisher: Enter the name of the publishing house as it appears on the title page.
- Series Information: Specify the name of the series or collection to which the book belongs, and indicate its number within the series if available.
- Year of Publication: Enter the year the work was published.
- Edition Statement: Indicate the edition of the work for example: 1st ed, 2nd ed, 3rd ed.

Physical Description:

- Extent: Record the total number of pages, followed by a space and the abbreviation for pages (e.g., p 232.).
- Other Physical Details: Include illustrations, tables, colored or pictorial covers, photographs, or any other notable physical features.
- Dimensions: Specify the size of the item in centimeters (e.g. 24 cm).
- Accompanying Material: Mention any supplementary materials provided with the book, such as maps, CDs, DVDs, or floppy disks.

Notes:

- General Note: Record general information not included elsewhere in the bibliographic record such as bibliographies, author biographies, or special remarks.
- Contents Note: Used to list the table of contents, chapters, or sections included in the work.
- Abstract: Provide a concise summary of the book's content, outlining the main ideas, objectives, and scope of the work.

Indexing:

- Categories: Controlled subject terms (from a predefined thesaurus) arranged hierarchically from general to specific.
- Choose from the existing list: Sélection d'une catégorie
- Or create a new category: Création d'une catégorie
- Keywords: Enter one or more descriptive keywords reflecting the book's subject. Separate multiple terms with a semicolon “;”

Language of Publication: Select the language of the book:

e.g., Arabic, French, English, etc.

- Original Language: Specify the original language if the book is a translation.

9- Standard Criteria for Selecting Automated Systems:

To ensure the delivery of high-quality services capable of attracting the largest possible number of users, libraries must carefully adopt an information system characterized by flexibility in data flow and effective interaction in file exchange between networked devices.

Achieving this goal requires adherence to a set of key indicators, summarized as follows:

9-1- Development of Cataloguing Rules

- International Standardization for Bibliographic Control (ISBD).

- Anglo-American Cataloguing Rules (AACR).

9-2- Structure of the Bibliographic Record:

- Standard Z39.50.
- Standard ISO 2709.
- Common Communication Format (CCF).
- MARC 21 Format for Bibliographic Data.
- Standards for cataloging electronic information resources.

9-3- Reference Protocols:

- Transmission Control Protocol / Internet Protocol (TCP/IP).
- File Transfer Protocol (FTP).

9-4- Hardware, Computing, and Networking:

- Administrative, human, and financial resource management.
- Collections and library services.
- Interconnections and networking between library systems.

These essential indicators constitute the core benchmarks for selecting an automated library system. Their alignment with international standards directly impacts the system's technical performance, efficiency, and interoperability, all of which ultimately serve the end-user who seeks an intelligent, reliable, and responsive information system capable of meeting research needs accurately, economically, and in minimal time.

Therefore, adopting these criteria allows the creation of mechanisms that structure information in a precise, interactive, and bibliographically controlled manner.

10- Conclusion:

Focusing on automated systems represents one of the most crucial topics in the field of library and information science. It is impossible to discuss rapid access to information without referring to the modern technologies that support the massive volume of data in today's digital age.

Automated systems serve as a true indicator of the developmental level of library management, reflecting the extent to which administrators recognize the operational challenges facing their institutions.

The greater the investment in these technologies, the fewer the obstacles in achieving efficient and timely information access; conversely, neglecting such developments results in increased burdens and delays for users seeking information.

The concern, therefore, should not be limited to the mere adoption of technology, but must extend to the quality and suitability of the automated systems themselves, systems that genuinely reflect the operational reality and ambitions of libraries.

Hence, it is essential to establish mechanisms and criteria for selecting such systems, as discussed throughout this study, ensuring that the objectives defined during the planning and systems analysis stages are met.

This, in turn, guarantees optimal conditions for users, enhances information retrieval processes, and strengthens the qualitative management of libraries and information institutions.

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