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THE DEVELOPMENT OF LIBRARY CATALOG: FROM PAPER TO ELECTRONIC

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Abstract

The development in information and communication technologi has changed the way of users in accessing the information in libraries. The libraries have replaced their card catalogues to OPACs and WebPACs. This research employs a descriptive qualitative approach through a literature review. *This paper defines the concept of OPACs and WebPACs, confers the development of OPACs & WebPACs technology in libraries, explaines the distinction between OPACs and Card Catalogues, and explains various features and advantanges of WebPACs.*

Keyword*: Library Catalog, Information Retrieval, Online Public Access Catalog, WebPAC*

INTRODUCTION

The library serves as a place for storage and dissemination of information, both in print and non-print materials. The abundance of information can pose challenges for both librarians and users if the tools for retrieval are not available in the library. In a library or information center, the catalog is one of the tools to retrieve collections of libraries.

Through the library catalog, users can access the information resources available in a library, and conversely, the library can inform users about what it possesses. Taylor, as mentioned in (Hasugian,2003:1) states that a library catalog is a systematic arrangement of a set of bibliographic entries representing a collection of a library. This collection consists of various types of materials, such as books, periodicals, maps, audio recordings, images, musical notations, and so on.

Meanwhile, (Sulistyo, 1993:317) states that a library catalog serves as a means to inventory the documents in a library and also functions as a tool for retrieving information. The main purpose of the library catalog is to assist library users in obtaining documents/information as efficiently as possible. Therefore, the existence of a catalog is a crucial element in a library.

The development of Information and Communication Technology have a significant impact on the evolution of library catalogs. Changes and improvements in library catalog systems are continually being made over time, particularly in their physical forms. Libraries have gradually shifted from using card catalogs to online catalogs or Online Public Access Catalogs (OPAC). The transition to OPAC aims to provide convenience for users to access the required information quickly and accurately.

The presence of OPAC has ushered libraries into the computer era, a medium that provides convenience for users to access information electronically. OPAC has brought significant changes to various library activities, including user education, reference work, acquisition, processing of library collections, and so on.

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The development of web technology in the 1990s has also significantly influenced the evolution of OPAC systems. The presence of web technology has inspired OPAC designers to continually innovate towards the perfection of OPAC systems. The emergence of web-based OPAC (Web OPAC) has replaced telnet-based or local network-based OPAC. Web OPAC is an interactive information retrieval system, allowing users to dynamically communicate with the system. Additionally, Web OPAC provides a range of new features not found in telnet-based or local network-based OPAC.

The development of library services is implemented through the creation of an Online Public Access Catalog (OPAC) service system, which serves as an online catalog for exploring the collections within the library. The OPAC service system simplifies students' utilization of library services and facilitates access to required references or books. Additionally, a notable benefit of the OPAC system is its accessibility from both within and outside the library. (Mukhtaruddin, et.el., 2022).

This article aims to elucidate the concepts of OPAC and WebPAC, discussing the technological advancements of OPAC and WebPAC in libraries. It delineates the differences between card catalogs and OPAC. Subsequently, it will outline several features present in WebPAC.

RESEARCH METODELOGY

This research employs a descriptive qualitative approach through a literature review. A literature review is a study that examines scientific writings (Purwanto, 2008). In this research, data collection is conducted by reviewing and thoroughly examining various scientific literatures related to the research subject. The data obtained from the literature review is then analyzed in several ways, including data reduction, followed by data presentation, and finally, data interpretation through the data analysis process.

RESEARCH FINDINGS

1. Concept of OPAC and WebPAC

Most literature discussing online library catalogs indicates that there is still no consensus on the standardized terminology for information retrieval systems in libraries. The terms used vary; some refer to it as a computer catalog, online catalog, automated card catalog, patron access catalog, or online public access catalog (OPAC). However, since the early 1980s, the term online public access catalog (OPAC) has been the most popular and widely used, (Zumer, 1993).

OPAC is a library catalog system that implements the use of computer technology. Most libraries design their own databases, using software that can be commercial, open-source, or custom-made. Through OPAC, users can access bibliographic information, locations, and collection statuses within a library. The catalog is typically designed to facilitate user-friendly information retrieval.

Reitz (2010), in the online dictionary of library and information science (ODLIS), defines OPAC, which stands for Online Public Access Catalog, as a database comprising bibliographic records describing books and other materials held by a library or library system. It can be accessed through workstations, typically located near the reference desk to facilitate users in seeking assistance from trained reference librarians.

Meanwhile, in a Dartmouth Conference in 1980, The Library of Congress defined OPAC as: "*an access tool and resources guide to the collections of a library or libraries,*

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which contains interrelated sets of bibliographic data in mechine-readable form and, which can be searched interactively on a terminal by users", (Gallup Fayen, 1983:4).

The above definition of OPAC indicates that an online catalog is a tool and guide for accessing a library's collection, containing a series of interconnected bibliographic data in machine-readable form. Users can perform interactive searches and explorations through workstations.

Furthermore, (Hildreth, 1983:235) defines OPAC as a computer-based library catalog designed to be accessed through a terminal or PC, allowing library users to directly and effectively search and retrieve bibliographic information without the assistance of intermediaries such as trained library staff. This perspective indicates that with the OPAC system, users can freely search for and retrieve information in the library. OPAC also enables users to access information effectively.

Meanwhile, Corbin (1985), as cited in (Hasugian, 2003:3) states that OPAC is a catalog containing bibliographic entries from the collection of one or more libraries, stored on magnetic disks or other recording media. It can be accessed and searched online by users through designated access points. Corbin emphasizes the role of OPAC as a means for storing and retrieving information online.

Tedd (1993) stated that OPAC is an online catalog system that can be accessed by the general public and used by users to search the catalog database. The purpose of this search is to determine whether the library holds specific library materials. Additionally, it aims to obtain information about the location of library materials. Similarly, users will find out about the status of the sought-after library materials, whether they are available in the library or currently on loan.

The definition of OPAC above emphasizes its function as an online information retrieval tool that is integrated with the circulation system. OPAC facilitates users in accessing and searching for information, allowing them to determine the existence of collections held by a library. Additionally, OPAC can provide users with information about the status of library materials or collections owned by a library.

Feather (1997), as cited by (Hasugian, 2003:4) states that OPAC is a bibliographic database usually describing the collections of a library. This system facilitates online access to explore library collections. Furthermore, users find convenience in searching through authors, titles, subjects, keywords, and more. This perspective emphasizes the role of OPAC as a tool for information retrieval and as a medium to communicate the presence or richness of a library's collection. Through OPAC, users can ascertain the number of titles, subjects, copies, and other details regarding a library's collection.

Christie (1986), as cited by (Kusmayadi and Andriaty, 2006: 53) states that there are several objectives aimed to be achieved in the development of OPAC as follows:

a. Users can directly access the database owned by a library.
b. Users can save costs and time in searching for information.
c. It can reduce the workload in database management, thus improving the efficiency of library staff.
d. It can expedite the search and retrieval of information.
e. It can serve the information needs of the community on a broad scale.

Based on several opinions about the definition of OPAC that have been mentioned above, we can observe some important features found in OPAC, as follows:

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a. In OPAC, there are records in machine-readable format: Machine-Readable Cataloging (MARC) is a standard format used by libraries to represent cataloging activities where information is stored, used, or transmitted in machine-readable form.
b. Bibliographic records in machine-readable format make it easy for library users to identify and retrieve desired information through computer terminals.
c. There are multiple access points available for users to access the library's collection: OPAC provides more access points to users compared to traditional card catalogs, which only have three access points such as author, title, and subject.
d. Through the online catalog, users can access bibliographic records more easily and quickly.
e. In information retrieval, the online catalog also allows users to access information in a library's collection using keywords and Boolean search.

Based on several definitions of OPAC mentioned above, it can be concluded that OPAC is a computer-based information retrieval system used by users to search and browse a library's collection. This system is designed to provide convenience to users in searching or retrieving information from a library's collection

2. WebPAC

In the 1980s, OPACs emerged in libraries, while WebPAC began to gain recognition in the late 1990s. WebPAC is a web-based library catalog, where users can conveniently access the library catalog through the Internet network without the need to physically visit the library.

Reitz (2012), in the Online Dictionary for Library and Information Science (ODLIS), defines WebPAC as an online public access catalog (OPAC) that utilizes a graphical user interface (GUI), accessible through the World Wide Web (WWW). This is in contrast to a text-based interface accessed through Telnet.

The above definition indicates that WebPAC is a library catalog available on the World Wide Web (WWW) or the Internet, where users can browse the required information through WebPAC by first connecting to the Uniform Resource Locator (URL). This can be done anytime and from anywhere as long as the PC is connected to the Internet.

Barbara (2001), as cited by Janu Saptari and Purwono, states that an installed catalog (online catalog) is a computer-based library catalog containing bibliographic data, where the data is stored on a web server, allowing direct online access through workstations, both locally and globally. This opinion emphasizes the role of OPAC as a medium for storing bibliographic data on a web server. With the data available on the web server, it becomes easier for users to search and browse information online without the need to physically visit the library.

Basically, there are two types of web-based OPACs in the library world: (1) Traditional OPACs converted to a web interface, and (2) OPACs that incorporate the Z39.50 protocol into the catalog. The Z39.50 protocol is a client-server communication tool that can interact with the search interface of the library catalog and other information sources on the Internet (Madhusudhan, 2011).

WebPAC is a program designed separately from the library program. This program aims to facilitate library users in accessing the OPAC through self-search and can ease the

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borrowing process. The WebPAC application also enables library members to obtain information about loans, reservations, and other related matters.

3. Development of Online Public Access Catalog

The first-generation of OPAC emerged around the 1960s and early 1970s, created in-house by libraries, resulting from the automation processes of cataloging and circulation. Both of these activities had already begun in the United Kingdom in the 1970s. This first-generation OPAC was not only a stand-alone system but also included bibliographic records for both monographs and journals. In other words, this first-generation OPAC system was nearly identical to a card catalog, as it contained bibliographic entries such as author, title, class number, and subject. Such a system is more suitable for conducting searches based on known terms (Tedd, 1992:27-37).

This first-generation of OPAC is slightly more advanced than conventional machine-readable catalogs because, in addition to allowing access through subjects, authors, and titles, it also enables searching through phrases using 'phrase searching'. The development of OPAC was quite simple, only capable of designing and creating a bibliographic recording tool based on Machine-Readable Cataloging (MARC) records. Its purpose was to locate informational resources such as monographs and journals in the library.

The second generation of OPAC emerged in the 1980s, marked by significant changes in the user interface. Keyword searches using Boolean operators were introduced, leading to an increase in the number of available access points. Furthermore, advancements and enhancements were introduced, such as search processes supporting the use of truncation and wild cards, the ability to search with index terms, full utilization of MARC records, and interactive search modifications. Second-generation OPACs also featured the ability to manipulate search results, along with the availability of a help system with more informative error messages (Husain and Ansari, 2006:43).

Nathalie Nadia Mitev, G. M Venner, and S. Walker (1985), as cited by Paiza Idris (1995:8), state that this second-generation OPAC can be considered more oriented towards online catalogs that use keywords or post-coordinate searching. It has the same accessibility functions as traditional information retrieval systems like DIALOG. Meanwhile, Hildreth, as mentioned by Paiza Idris (1995:8), argues that this second-generation catalog is a marriage between a library catalog and a conventional online information retrieval system.

Despite changes and improvements made to the OPAC system, users still encounter difficulties in using it. The challenges faced by users arise because most changes and improvements are only made to surface features, while there is no enhancement in the core functionalities (Borgman, 1996:501).

Most OPAC systems of this generation are designed and marketed by commercial companies. Among the well-known brands are ADVANCE from Geac, BLS from BLCMP, TINlib system from IME, OCLC, SLS, CLSI, URICA, VTLS, DOBIS-LIBIS, DYNIX, Libertas, ADLIBm, Librarian, and URICA. These OPAC systems are heavily influenced by commercial bibliographic databases and have capabilities similar to the Dialog system. They are integrated systems with several modules, such as cataloging, circulation, periodicals, and interlibrary loans.

The emergence of web technology in the 1990s significantly influenced the development of OPAC. In this generation, several different concepts/ideas have emerged compared to the previous OPAC generation.

E-ISSN: 2747-2140
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Some researchers state that the third-generation OPAC was introduced in the early 1990s, providing features such as non-Boolean search methods (like *, +, -, ".."), automatic assistance, and displaying the most relevant records (Tedd, 1993:41). Meanwhile, Husein and Ansari (1994) state that additional features have also been introduced, such as the Z39.50 protocol and Graphical User Interface (GUI). Furthermore, the design of OPAC interfaces has shifted towards more user-friendly interfaces that allow for advanced search capabilities.

Researchers have identified several key advancements achieved by the third-generation OPAC, as follows:

a. Third-generation OPACs have implemented the Z39.50 protocol and a web interface, transforming the function from a traditional OPAC to a gateway (Babo and Brien, 2012). For instance, some OPACs provide links to publishers, companies, journal articles, tables of contents, and full-text content for users (Hamrsen, 2000:112). Z39.50 is a widely used data exchange protocol in libraries, known for its interactive nature. It is a standard client-server-based protocol that allows client computers to search and retrieve information from data servers.
b. Users can utilize the web interface to search for information sources in the library, both in print and electronic formats, as well as external information sources (Mathias, 2003:28-36).
c. OPACs have integrated several new features such as ranking search results (Large & Beheshti, 1997: 111-133), presenting bibliographic records with images (Mathias, 2003:28-36),, and including Uniform Resource Locators (URLs) in the catalog (Joint, 2007:183.

Despite continuous significant changes and improvements in the functions of OPAC, its existence still does not fully meet the users' needs. This is due to limitations in the search capabilities of the system.

4. Conventional Catalog Versus Online Public Access Catalog

Before OPAC was introduced, card catalogs were one of the most widely used forms of catalogs in libraries. However, after OPAC emerged in the early 1980s, some specific libraries began to transition from card catalogs to OPAC. Libraries have various reasons and considerations when deciding to switch from card catalogs to OPAC. Houghton (1977) in Janu Saptri and Purwono (2006) stated that there are several conveniences that can be gained by using OPAC, as follows:

a. Time-saving
b. Search results in a fixed format
c. Issues related to geographical/location can be overcome
d. Accessible to many users
e. Online bibliography searches allow for obtaining more citations.

In principle, the basic functions of card catalogs and OPAC are the same, namely as tools for retrieving information in the library. Fattahi (1995) in (Hasugian, 2003) revealed some differences between card catalogs and OPAC, viewed from the aspect of search activities, including:

a. Bibliographic entries. Bibliographic entries in OPAC can be searched in various ways and displayed in various formats, while bibliographic entries in card catalogs can only be traced in one way and displayed in the same format.

E-ISSN: 2747-2140
DOI: 10.22373/ijlis.v5i1.4278

b. Interactive (computer communication with users). OPAC is an interactive catalog, providing communication facilities between the computer and the user through a mode or method that is dialogical. OPAC can react and respond to users in an intelligent manner, guiding them during searches. However, this interactive search approach is not possible with a static/passive card catalog system.
c. User assistance. OPAC has the ability to provide user assistance in various ways and levels, directly readable on the system, such as retrieval aids, linguistic aids, navigational aids, and semantic aids. In contrast, card catalogs cannot provide search assistance facilities like those found in OPAC systems.
d. Ease of searching. Through OPAC, users can search for documents in various ways, such as keyword searches in all fields, using Boolean operators, word adjacency operators, and so on. Wide access to all bibliographic entries has also been provided by the OPAC system. Additionally, search results through the OPAC system can be displayed systematically and variably. Meanwhile, with a card catalog, searches can only be performed based on subjects, titles, or authors.
e. Output and display. In the OPAC system, the form and content of bibliographic displays can be in a flexible format, with the possibility of displaying bibliographic information in various variations and at different levels. Similarly, the level of bibliographic description in OPAC is usually flexible and can be designed according to user needs. In contrast, the form and content of bibliographic displays in card catalogs always adhere to the same format.
f. Availability and access. OPAC can be accessed through terminals in different locations, either inside or outside the library building, through local area networks (LAN) and wide area networks (WAN). Likewise, with OPAC, users can simultaneously use the system, even searching the same entries at the same time. Such an atmosphere is not possible when using a card catalog.

In short, the OPAC system provides many conveniences to users in searching and accessing information compared to traditional card catalogs. With OPAC, users can interact with the system, modify search methods and information displays to optimize search results according to their information needs.

5. WebPAC Fiture

The advancements in search engines with their sophisticated and attractive features have impacted the design of OPAC and user habits in conducting searches. The popularity of the web has influenced the mindset, expectations, and behavior of users when using webPAC interfaces. Therefore, libraries should appropriately design a webPAC system by incorporating features and functions similar to those found in search engines.

Research and discussions about web-based OPAC continue to be conducted continuously, both regarding its features and functions. Babo and O'Brian (2012) in their article "Web OPAC Interfaces: An Overview" mention several important features found in webPAC, such as:

a. Graphical User Interface (GUI) is a type of interface used by users to interact with the operating system through graphic images, icons, menus, and using pointing devices such as a mouse or trackball. Windows, icons, menus, pointing devices are the main elements of GUI.

E-ISSN: 2747-2140
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b. Common features found in traditional OPAC, such as bibliography and full-text database storage, providing direct access to the library's bibliography database through terminals or PCs; offering instructional assistance; displaying search results in an easily understandable format; accessible remotely; providing information about community activities; connecting to circulation files, reference aids, and more; enabling searches through various access points such as author, title, keywords, subject, periodical title, class number, ISBN or ISSN, and others.
c. Capable of using hypertext connections to facilitate navigation through bibliography records.
d. Moving towards competition with display and search features similar to those found in search engines.
e. Linked to full-text if available.
f. Has the ability to converge searches for all electronically-based information through a single interface, such as catalogs, CD-ROMs, databases, and other information sources on the Internet.

Meanwhile, Harmsen (2000) in his article "Libraries and the Web: Adding value to Web OPAC" mentions several features found in the Web OPAC STAR, as follows:

a. Users can send commands and requests directly through the Web OPAC while conducting searches and exploration.
b. Availability of search through expert search mode.
c. Hyperlinks, full text, and table of contents are provided.
d. Bibliographic display in both horizontal and vertical formats.
e. Features include links to publishers, companies, journal articles, tables of contents, and full-text for customers.
f. Additional facilities are available for users who want to perform other transactions, such as updating address information, paying fines, or canceling reservations through the library's web interface.

Furthermore, Husein and Ansari (1994) mentioned several other features, such as the Z39.50 protocol and Graphical User Interface (GUI). On the other hand, WebPAC has also been integrated with some new features, such as ranking search results (Large & Beheshti, 1997), presenting bibliography records with images (Mathias, 2003), and including Uniform Resource Locator (URL) in the catalog (Joint, 2007). Users can also use the web interface to search for information sources in the library, both print and electronic, as well as external information sources (Mathias, 2003).

Although web-based OPACs have introduced new features, not all Library Management System (LMS) suppliers provide comprehensive features on the portals they design, such as federated search, user services, loan updates, and interlibrary loan request services. Most LMS suppliers only offer common features similar to those found in traditional OPACs.

Currently, there are numerous web-based OPAC software available in the market, both commercial and free (open source). ISISONLINE, IGLO (ISIS Go Online), Senayan Library, and Ganesha Library System (GLIS) are examples of domestically developed web-based OPACs that can be obtained for free (open source). On the other hand, Athenaeum Light, PHPMyLibrary, and GREENSTONE are examples of internationally developed web-based OPACs that are also available for free.

Based on the previous explanation, there are several advantages to web-based OPACs: (1) End-users are already familiar with using standard interfaces like those found

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in web browsers, thereby minimizing training for end-users. (2) They utilize hyperlinks to text documents, database reports, and searches, similar to regular web browsers. End-users find that basic functions in searching and navigating through the World Wide Web are user-friendly.

CONCLUSION

The library catalog, whether in the form of cards, OPAC, or Web OPAC, serves as a crucial information retrieval tool in a library or information center. The library catalog, in any form, will continue to be essential for libraries because the "essence" of the information retrieval system lies in the library catalog. Through the library catalog, users will find convenience in accessing and rediscovering information. Conversely, libraries can easily communicate their collections to users.

As one of the institutions providing various information sources to the community, libraries need to continuously innovate to enhance their capabilities in providing services to users. Thus, libraries should adapt to the developments in information and communication technology and be responsive to users' habits in seeking information. With the hope that libraries will continue to be seen as relevant places for individuals to obtain information.

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