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Using Artificial Intelligence in Beneficiary Data Analysis and Its Role in Improving Library Services

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Abstract

This study aimed to highlight the essential role that artificial intelligence playsin developing the library work environment through the in-depth and precise analysis of beneficiary data, ensuring improved service quality and greater alignment with users' evolving needs. This is achieved by analyzing circulation records, search logs that reflect users' scientific and intellectual interests, temporal usage patterns that reveal peak library visitation times, as well as bibliographic data that allow the classification of beneficiaries by age or educational categories.The results showed that such tools enable libraries to improve collection management by directing budgets toward materials with high demand, in addition to enhancing staff efficiency by reducing routine tasks and allowing more time for activities requiring direct human intervention. The study confirms that integrating artificial intelligence technologies into library environments is no longer a technical luxury but has become a strategic choice to ensure the sustainability of libraries amid rapid digital transformations, provided that strict adherence to user data privacy and security is maintained.

Keywords

Artificial intelligence, Libraries, Library services, Beneficiary data analysis, Smart libraries.

الملخص

هدفت هذه الدراسة إلى إبراز الدور الأساسي للذكاء الاصطناعي في تطوير بيئة العمل المكتبية عبر تحليل بيانات المستفيدين بشكل متعمق ودقيق، بما يضمن تحسين مستوى الخدمات وجعلها أكثر انسجاما مع متطلباتهم المتجددة، وذلك بتحليل سجلات الإعارة، وسجلات البحث التي تعكس اهتمامات المستفيدين العلمية والمعرفية، وأنماط الاستخدام الزمني التي تظهر أوقات الذروة في ارتياد المكتبة، بالإضافة إلى البيانات البيبليوغرافية التي تتيح تصنيف المستفيدين وفق الفئات العمرية أو التعليمية.أظهرت النتائج أن هذه الأدوات تمكن المكتبات من تحسين إدارة المجموعات عبر توجيه الميزانية نحو المواد ذات الطلب المرتفع، إلى

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جانب رفع كفاءة العاملين عبر تقليل المهام الروتينية وإتاحة المزيد من الوقت للأنشطة التي تتطلب تدخلا بشريا مباشرا، وتؤكد الدراسة أن دمج تقنيات الذكاء الاصطناعي في بيئة المكتبات لم يعد ترفًا تقنيا، بل أصبح خيارا استراتيجيا لضمان استدامة المكتبات في ظل التحولات الرقمية المتسارعة، شريطة الالتزام الصارم بحماية خصوصية وأمن بيانات المستفيدين.

الكلمات المفتاحية

الذكاء الاصطناعي، المكتبات، الخدمات المكتبية، تحليل بيانات المستفيدين، المكتبات الذكية.

1. Introduction

Libraries in the digital age are undergoing fundamental transformations in the nature of their work and the mechanisms through which services are delivered, as a result of rapid developments in information and communication technologies and the growing reliance on big data and intelligent analytics. In this new reality, the success of libraries has become contingent upon their ability to understand their beneficiary audiences and analyze their informational needs with precision. Here, beneficiary data analysis emerges as a strategic tool that enables libraries to move from providing general services to delivering targeted and personalized services grounded in evidence and factual insights.

Beneficiary data analysis includes studying various usage patterns such as borrowing, search queries, browsing digital resources, attending events, participating in activities, and even interactions with the library's electronic platforms. When these data are analyzed systematically, librarians can identify gaps in their collections, determine the knowledge areas that require enrichment, and allocate budgets toward resources that meet the actual demand of their users.

In addition, data analysis helps libraries predict future trends in information demand, thus enabling proactive planning for acquiring suitable materials at the right time. This enhances the efficiency of acquisition processes and reduces financial waste. This approach also grants libraries a competitive advantage in a knowledge environment characterized by rapid changes and diverse user needs.

Amid these transformations, there is a growing need for an in-depth examination of the role of beneficiary data analysis in improving acquisition processes and collection development, especially in the Arab context, where this field still faces challenges related to limited awareness of data importance and the scarcity of technical and human resources qualified to utilize data effectively.

Study Problem:

Despite the significant potential that beneficiary data analysis offers for developing library services, many libraries continue to rely on traditional methods in decision-making without fully benefiting from the data available to them. From this perspective emerges the following problem:

To what extent are libraries aware of the importance of analyzing beneficiary data? And how capable are they of employing such analyses to meet the actual needs of beneficiaries and improve library services?

Study Questions:

- To what extent do libraries employ beneficiary data analysis across their various operations?
- What types of data are collected and analyzed to support decision-making in libraries?
- How does beneficiary data analysis contribute to identifying acquisition priorities and limiting financial waste?
- What challenges do libraries encounter when implementing data analysis systems?
- What benefits emerge from analyzing beneficiary data through artificial intelligence?

Topic Importance:

The significance of this study lies in its focus on a crucial aspect of contemporary library management, namely the use of beneficiary data analysis to enhance the services offered across different types of libraries. It also contributes to promoting professional awareness of the importance of adopting data-driven analytical approaches rather than random or traditional decision-making, which ultimately leads to services that better correspond to beneficiary needs, improved efficiency in the use of financial resources, and the achievement of library objectives in supporting education and scientific research.

Reasons for Choosing the Topic:

- The limited number of studies addressing the relationship between beneficiary data analysis and library services.
- The need to support libraries with modern scientific approaches for decision-making.
- The intention to emphasize the role of technology and data analysis in improving library efficiency.
- The contribution to providing practical recommendations that libraries can apply to develop their services and collections.

Study Objectives:

– Analyzing the role of artificial intelligence in processing beneficiary data within libraries and examining its potential to improve service quality.

– Identifying mechanisms for utilizing artificial intelligence techniques to better understand usage patterns and beneficiary preferences with greater accuracy.

– Clarifying the impact of intelligent data analysis in supporting decision-making

related to the development and organization of library collections.
– Examining the feasibility of predicting future beneficiary trends through artificial intelligence tools and applying such predictions in the proactive planning of services.
– Proposing methods to enhance the efficiency of managing material and human resources in libraries by employing the outcomes of intelligent data analysis.
– Identifying the challenges that libraries may confront when applying artificial intelligence techniques to analyze beneficiary data.

1– Definition of Artificial Intelligence:

Artificial intelligence is a branch of computer science that enables machines to think in ways comparable to humans, meaning a computer endowed with a form of intellect. It is defined as specific behaviors and characteristics exhibited by computer programs that allow them to simulate human cognitive abilities and patterns of mental functioning. Among its most significant features are the capacity to learn, infer, and respond to circumstances for which the machine was not originally programmed. These systems or devices emulate human intelligence in performing tasks and possess the ability to improve themselves based on the information they gather. (Rizk, 2021, p. 581)

Artificial intelligence (AI) has been defined as the ability of machines to learn through experience, mimicking human intelligence in performing tasks and developing themselves based on information they gather, examine, analyze, and pattern extract.

The concept of AI also refers to the ability of information systems to correctly interpret external data, learn from this data, and use that knowledge to achieve goals through flexible adaptation (Seddar&Touati,2022,p.371).

2– History of Artificial Intelligence:

Artificial intelligence emerged in the 1950s and was first introduced by the British mathematician Alan Turing through the concept of the "Turing Test," which evaluates whether a machine can behave in a way that resembles intelligent human performance. At the Dartmouth and Hanover conferences on artificial intelligence in 1956, McCarthy—who was the first to coin the term "Artificial Intelligence (AI)"—attracted considerable academic and scientific interest to the field. Research in artificial intelligence began to develop independently from computer science and automation, and a defined framework for the field was proposed as the programming of intelligent machines. By 2007, artificial intelligence became more closely linked to intelligent computer programs.
Between 1990 and 2000, artificial intelligence witnessed substantial progress through the emergence of techniques such as expert systems, fuzzy logic, and deep learning. In 1997, the chess program "Deep Blue" achieved a historic milestone by defeating the world chess champion Garry Kasparov, generating widespread attention regarding the potential and capabilities of artificial intelligence systems.
From 2010 to the present, artificial intelligence has experienced remarkable expansion driven by technological advancements, powerful data-processing capabilities, and

increased data availability. Developments in deep learning and artificial neural networks have had a particularly significant impact. Through these technologies, artificial intelligence systems have acquired the ability to analyze images and restore missing components—such as completing incomplete car plate numbers—recognize voices and faces, perform machine translation (both spoken and written), process images, play complex games, operate robotics, and support autonomous driving.

Artificial intelligence has also advanced personal assistant technologies used across fields such as medicine, commerce, marketing, and finance. One of the widely recognized models within open artificial intelligence systems (OPEN AI) is GPT-4, which is applied in intelligent dialogue, translation, and automated writing. (Awad, 2023)

3– Importance of Using Artificial Intelligence in Libraries:

The use of modern technologies represents one of the most visible manifestations of digital transformation in libraries and information centers, and it simultaneously constitutes one of the most important applications of artificial intelligence in this vital domain. It has become evident that the future of artificial intelligence in libraries depends on this technology's capacity to create more efficient and effective tools and services that enhance the quality of library operations and facilitate access to knowledge. Over time, opportunities for integrating artificial intelligence into the information infrastructure of libraries continue to expand, strengthening their ability to adapt to user needs and to provide advanced and personalized services.

Artificial intelligence technologies are employed in libraries for several essential functions, including automated cataloging and classification, which accelerate the processing of information resources and minimize reliance on human intervention; intelligent documentation, which utilizes algorithms to interpret document context and accurately identify keywords; and collection development strategies based on analyzing the interests and informational behaviors of beneficiaries. These technologies are also used to enhance search and retrieval through intelligent systems capable of understanding natural language and producing more accurate and relevant results.

Among the most prominent practical applications of artificial intelligence in modern library environments are: library robots used for assistance or shelving tasks; optical character recognition (OCR) technologies used in digitization projects to convert print materials into searchable digital text; augmented reality to enrich user experience; geographic information systems (GIS) to support access to knowledge sources within the library space; and big-data analytics to understand user needs and tailor services accordingly. (Hindi Ahmed, 2022, p. 143)

4– Major Applications of Artificial Intelligence in Libraries:

4-1-Smart libraries:

These libraries represent the evolutionary stage that followed digital libraries. Artificial intelligence supports the construction and design of interactive and intelligent information facilities capable of responding to beneficiaries through smart applications. It has also contributed to the emergence of the "smart librarian," who can provide intelligent reference services tailored to user needs.

4–2– Expert systems in the field of libraries and information:

These systems are intelligent tools designed to facilitate precise access to information through the processes involved in building and developing documentary collections, cataloging, classification, and indexing. As data become more complex, this complexity is reflected in the precision of system outputs, thereby enhancing the system's efficiency and increasing its expertise in delivering knowledge to beneficiaries. This is most evident in the knowledge base, ontology-based search engines, and interactive user interfaces.

4–3– Smart applications:

These applications encompass all information-service–related areas that rely on devices or equipment, such as intelligent robots, augmented reality, OCR technologies used in digitization projects, and the Internet of Things, which significantly contributes to gathering large amounts of data used to study user behavior. They also include the smart circulation system and hologram technologies aimed at promoting and supporting the services and activities offered by the information facility to its beneficiaries.

4–4– Smartphone applications in libraries and information centers:

The widespread use of smartphones among beneficiaries has compelled libraries to align with this behavior by offering a range of mobile applications that support the smart systems operating within the library environment and facilitate remote communication via the Internet. Examples include intelligent chat technologies, the smart catalog, and various related services that enhance user interaction and access to information.

4–5– Smart management:

The adoption of integrated and intelligent management systems in administering libraries and information facilities contributes to rationalizing available resources—whether financial, by ensuring expenditures remain aligned with actual needs, or functional, by enhancing the performance of librarians and information specialists. This is achieved through the efficient and effective investment of their scientific and practical skills and knowledge. Such systems also reinforce the governance of information facilities, strengthen transparency in their management, and promote services consistent with smart management principles and the successful implementation of information marketing strategies. (Badi', Boukerzaza, 2023, p. 69)

5– Analyzing beneficiary data and its role in developing library services:

Libraries can benefit significantly from data analysis in managing their collections, developing information services, and improving the delivery of these services. It also supports decision-makers within the library. Data analytics help predict the evolving and recurring needs of beneficiaries by relying on user-generated data collected through various communication channels between users and the library. Additionally, data analysis contributes to providing more accurate, efficient, and enhanced information services based on anticipating user needs, such as reference services, which have become faster, more precise, and broader in scope than in previous practices.

In addition, document supply services benefit from the availability of digital copies of various information sources and the reliance on databases and communication tools that facilitate the delivery of information and its sources to beneficiaries at their residence with minimal effort and in the shortest possible time.

Data analytics also enrich library collections with diverse information resources, including databases and smartphone applications. They support decision-making within the library and enable the selection of activities and events that correspond to the cultural, social, and artistic needs of beneficiaries. They likewise encourage library staff to engage in professional development and enhance their daily performance.

Furthermore, data analytics hold substantial importance in libraries, offering a significant competitive advantage when libraries are able to utilize and process them effectively. They provide a deeper understanding of beneficiaries and their requirements,which in turn supports more effective and appropriate decision-making based on information extracted from beneficiary databases. This ultimately leads to delivering more efficient information services. (Mohammed, 2021, p. 122)

6– Major Applications of Artificial Intelligence in Analyzing Beneficiary Data:

6–1– Recommender Systems:

Recommender systems represent advanced intelligent technologies that have become fundamental in enhancing library services. They are employed to facilitate beneficiaries' access to the most suitable resources and content based on their interestsand previous behaviors. These systems rely on analyzing a wide variety of user-generated data, such as search logs, borrowed books, browsed materials, submitted ratings, and topics that have captured user attention.

Through this analysis, recommender systems provide personalized suggestions for each user, contributing to an improved user experience, easier access to information, and higher levels of satisfaction with library services.

The mechanisms of recommender systems in library environments vary. Some systems are content-based, recommending resources similar to those previously favored by the user.

Others are collaborative systems that rely on identifying similarities in usage patterns among different users to suggest resources based on shared preferences. There are also hybrid systems that combine both approaches to achieve greater accuracy and more effective performance.

The significance of these systems lies in their ability to analyze user behavior to detect general usage trends, which assists library management in making decisions related to resource allocation in alignment with user interests. They also help identify needs that users may not explicitly express and contribute effectively to shaping future plans and enhancing the quality of services provided. (Loca, 2023)

6–2– Clustering and Pattern Analysis Techniques:

Clustering and pattern analysis techniques are among the most important artificial intelligence tools used to analyze beneficiary data within libraries. These techniques are employed to categorize users into groups with similar characteristics and behaviors based on actual data such as borrowing records and academic information.

This classification provides a precise understanding of usage patterns among different beneficiary categories—for instance, first-year university students compared to postgraduate students—in terms of preferred resource types, usage frequency, and topics of particular interest.

Such analysis helps identify hidden relationships between user characteristics and their behaviors, such as correlations between academic specialization and frequently borrowed resources. This supports the development of customized services and informs recommender systems to better match the needs of each user category.

Additionally, these analytical methods enable libraries to track changes in user informational behavior over time, allowing for intelligent planning of future services and collection development that reflects the actual interests of the user community.

This data driven approach enhances the user experience and strengthens effective access to knowledge within the library environment. (Silwattananusarn, 2023, p. 163)

6–3– Techniques for Predicting Beneficiary Needs and Enhancing Search and Discovery Systems:

With the growing volume and diversity of information, the development of accurate and efficient search systems has become essential to meeting the rising expectations of users. These systems rely on artificial intelligence techniques such as natural language processing and intelligent inference to understand user queries and interact with them intelligently. Natural language processing assists in interpreting question structures and analyzing textual content, while intelligent inference offers precise suggestions and targeted search results. These techniques enable users to access appropriate resources quickly, thereby improving the overall search experience.

Moreover, artificial intelligence can be applied to enhance discovery processes within libraries, such as identifying related or similar resources to those being searched for, through big-data analysis and machine learning techniques. Popular applications of artificial intelligence in search and discovery include voice search, where AI interprets spoken language to produce relevant results, and image search, in which AI recognizes and analyzes visual content to generate accurate search outputs. (Hayek, 2024)

Artificial intelligence also contributes to improving operational management within libraries, particularly through predictive analytics that allow the anticipation of future demand for specific information resources. This type of analysis supports informed decision-making regarding material acquisition and collection organization to align with beneficiary needs.

This proactive approach serves as an effective method to ensure the availability of resources at the appropriate time, enhancing the library's capacity to meet the requirements of students, researchers, and educators efficiently. Artificial intelligence also enables the analysis of past usage data and informational trends among beneficiaries, guiding collection development policies and resource allocation with greater precision and effectiveness. (Green, 2019, p. 35)

6–4– Satisfaction Analysis and User Experience Enhancement:

Analyzing beneficiary satisfaction constitutes one of the essential indicators used by libraries to improve their services and enhance user experience. With the advancement of artificial intelligence technologies, it has become possible to employ intelligent tools to monitor user impressions and analyze their interaction data with provided services.

For instance, sentiment analysis can be used to interpret beneficiary responses gathered through digital surveys or social media platforms, assisting in determining satisfaction or dissatisfaction levels with high accuracy. Machine learning algorithms also contribute to predicting user satisfaction based on behavioral patterns within the library's digital systems, such as interaction duration with resources, the number of successful searches, and the types of content accessed.

These analyses allow libraries to continually evaluate the quality of their services and develop flexible policies that respond to evolving beneficiary needs, thereby strengthening institutional performance and increasing satisfaction among the targeted audience. (Chaillot, 2021, p. 48)

7– The Impact of Beneficiary Data Analysis on Library Services:

7–1– Improving Reference Services:

Applications of artificial intelligence in libraries contribute to the execution of a wide range of tasks, including responding to incoming inquiries, assisting in search and retrieval processes, serving as virtual librarians, and supporting promotional and marketing activities. The benefits of artificial intelligence extend beyond operational functions to include the analysis of beneficiary data. AI technologies can track user behavior, interests, and usage

patterns of resources and services, which assists libraries in designing more customized and effective reference services.

One of the most notable advantages of employing artificial intelligence in providing reference services is its capacity to handle large volumes of inquiries simultaneously without being affected by fatigue or repetition. In addition, AI systems possess advanced capabilities for interactively delivering information.

Moreover, big-data analysis allows the development of intelligent knowledge bases derived from previous experiences and frequently asked questions, thereby enhancing the quality of responses and accelerating access to information. These services become particularly attractive and effective for younger generations who favor digital interaction over traditional human communication, making artificial intelligence a central element in enhancing user experience within the modern library environment. (Al-Badi, 2025, p. 32)

7–2– Personalizing Recommendations Based on Users:

Personalizing recommendations for users represents one of the most advanced applications of artificial intelligence in digital and modern library environments. This customization relies primarily on user data analysis. By tracking beneficiary behavior- such as borrowing history, search queries, reading preferences, and interaction rates with specific resources- AI algorithms analyze these data to construct precise user profiles.

Through the use of machine learning techniques and big-data analytics, intelligent systems in libraries can identify recurring behavioral patterns among beneficiaries, enabling them to provide knowledge-based recommendations tailored to individual interests. For instance, if usage data indicate that a beneficiary frequently engages with topics related to literature or social sciences, the system automatically suggests relevant content, such as books, articles, databases, or even events and activities organized by the library, without the need for the user to request them explicitly. (Barazi, 2025)

Artificial intelligence can also simplify the discovery and retrieval of new materials, assisting library patrons in finding resources they may not have encountered otherwise. AI-based recommendations of similar resources support researchersbrowsing library databases by significantly reducing search time.

Overall, AI systems possess the capability to read for users, inform them, advisethem, teach them, correct their mistakes, and respond patiently to their various needs. (Romero, 2018)

7–3– Improving Cataloging and Classification Processes:

Analyzing beneficiary data contributes to improving cataloging and classification processes by applying artificial intelligence to enhance the accuracy and efficiency of these operations. This improvement is achieved through advanced techniques such as Optical Character Recognition (OCR), which processes texts and converts them into digitized, indexable data.

These technologies help accomplish demanding and complex tasks that may be challenging for human staff to perform manually, while completing them at speeds that exceed human capabilities with reduced error rates.

The benefits of artificial intelligence in this context include saving time and effort, reducing operational costs, and supporting libraries in creating accurate metadata for digital

resources, which accelerates cataloging processes and enhances overall efficiency. As a result, libraries are better equipped to deliver reliable, accurate, and timely information services to their patrons.

Artificial intelligence also supports various aspects of library work—both technical services and patron services—by improving the browsing experience on the library's website, assisting in search functions, supporting diverse technical operations, and guiding collection development to meet the multifaceted needs of beneficiaries. (Tella, 20323, p. 166)

7–4– Improving Information Resource Acquisition:

Studying beneficiary data represents a central tool in supply strategy and collection development in libraries, as it provides a deep understanding of user needs and informational behavior through objective indicators such as borrowing patterns, search queries, browsing logs, and electronic usage records. By analyzing these data, libraries can identify knowledge gaps in their collections, determine titles and resources that are in high demand, and recognize materials that show declining usage. This enables the intelligent allocation of budgets and the acquisition of resources that genuinely correspond to beneficiary needs.

This analysis also makes it possible to predict demand trends. For example, anincrease in searches related to a particular topic may indicate a future need to acquire additional resources or organize relevant events. Additionally, data analysis allows librarians to design flexible acquisition policies, such as purchasing digital copies or establishing temporary subscriptions, which reduces financial waste and enhances the impact of collections on the knowledge community served by the library.

When the results of this analysis are combined with beneficiary satisfaction surveys and quality-related data, the supply process becomes an evidence-based institutional practice, strengthening the library's capacity to meet current and future needs effectively and efficiently. (Al-Wardi, 2022, p. 123)

8– Challenges of Using Artificial Intelligence in Analyzing Beneficiary Data:

Technological advancement creates challenges for libraries that affect their physical and philosophical infrastructure. Libraries have adopted new technologies to benefit from their features and advantages in modernizing their services. The adoption of smart services capable of meeting the needs of smart users requires intelligent librarians equipped with updated and contemporary skills. (Adetayo, 2023)

Some librarians may perceive technology as a potential threat that could replace them. Therefore, they must maintain adaptability, openness to new ideas, personal engagement, and a user-centered approach. Financial constraints also represent major obstacles that may hinder the transformation and development of smart services due to the high cost of acquiring required equipment. Technical challenges-such as system failures or human errors-also raise concerns.

Privacy represents another crucial issue, User data privacy and security are directly linked to data collection, storage, analysis, processing, reuse, and sharing. These processes form the foundation of smart services that rely heavily on big data and advanced analytics. Maintaining privacy remains one of the most difficult aspects associated with big data.

Some librarians argue that implementing artificial intelligence in library operations faces specific obstacles that must be addressed before the technology can be adopted. Financial

challenges are critical to integrating artificial intelligence into libraries, as many institutions lack adequate resources. (Ajani, 2022, p. 224)

Additionally, infrastructure poses a significant barrier, as artificial intelligence requires advanced technological tools for successful operation. Poor infrastructure limits the ability of AI to support library services. Resistance to change also represents a challenge; some librarians show limited interest in adopting new and innovative technologies, and negative perceptions about their own technological competencies may hinder AI adoption.

Other obstacles include weak network connectivity, unstable power supply, shortages of trained staff, outdated technologies, economic pressures, and the high cost of technological tools that must be addressed before adopting AI in library operations. Despite these challenges, artificial intelligence is expected to introduce substantial improvements to library processes, including enhancements in information delivery services and time efficiency. (Atika, 2023, p. 46)

Study Results:

– Beneficiary data analysis enhances decision accuracy because the analysis relies on borrowing records, search queries, and electronic browsing logs, helping select library materials that align with beneficiaries' actual needs instead of depending solely on general estimates or personal expertise.

– Improving budget management efficiency, as data are employed in the acquisition process, enabling libraries to direct financial resources toward high-demand materials and reducing waste caused by purchasing underused items.

– Bridging knowledge gaps in collections, as usage pattern analysis reveals subjects or knowledge areas that are insufficiently represented, helping in planning to strengthen them.

– Predicting future trends, since data analysis allows the identification of early indicators of rising interest in certain topics, enabling libraries to prepare in advance by providing relevant resources.

– Challenges related to the reality of libraries show a lack of investment in beneficiary data due to limited awareness of its importance, the absence of technological infrastructure, and the shortage of qualified personnel capable of analyzing data and utilizing the results.

– Employing beneficiary data analysis enhances competitiveness and the quality of library services, as it increases the library's ability to meet the needs of its audience quickly and effectively, raising beneficiary satisfaction and strengthening the library's position within the community.

Study Proposals:

– Enhancing awareness of the importance of analyzing beneficiary data by organizing training courses and workshops for library staff to strengthen their understanding of the role of data in supporting decisions that contribute to the development of library services.

– Developing technological infrastructure and investing in advanced library management systems capable of automatically and accurately collecting and analyzing data, while ensuring full integration with the library's electronic platforms.

– Preparing specialized personnel by providing advanced training programs in data analysis and interpretation for librarians, or by hiring data science specialists to support library operations.

– Integrating quantitative and qualitative data analysis by combining numerical statistics (such as borrowing rates) with qualitative indicators (such as beneficiary satisfaction surveys) to gain a more comprehensive understanding of user needs.
– Establishing flexible acquisition policies based on adaptive strategies for resource procurement, such as temporary subscriptions or demand-driven acquisition, guided by actual data indicators.
– Activating demand-forecasting tools by using artificial intelligence– based predictive algorithms to anticipate future usage trends and adjust acquisition plans accordingly.
– Expanding research in this field by encouraging applied studies in libraries to measure the impact of beneficiary data analysis on service quality and resource management efficiency.

Conclusion:

Analyzing beneficiary data represents an effective and central tool in developing and improving library services, as it provides a deep understanding of user needs and informational behaviors and helps direct financial and human resources with high efficiency. Systematically investing in these data contributes to reducing knowledge gaps, enhancing service quality, and strengthening the library's ability to adapt to rapid transformations in the information environment.

However, practical reality shows that many libraries - especially in Arab countries - continue to face challenges related to limited awareness of the importance of data, inadequate technological infrastructure, and a shortage of specialized personnel capable of utilizing data effectively. Therefore, adopting clear policies to develop staff skills, providing appropriate systems and technical tools, and integrating quantitative and qualitative analysis into decision-making becomes essential. These measures ensure improved acquisition processes and enhance the library's ability to serve its community more effectively.

Thus, adopting a data-driven approach will not be merely an optional choice but a fundamental requirement to ensure the sustainability and effectiveness of libraries in the age of knowledge and artificial intelligence.

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