



Innovative technologies and methods in the management of higher education establishment library

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Abstract. The purpose of the article is to analyse and summarise the features of a modern approach to library management in a higher education establishment (HEE) involving the introduction of innovative technologies and methods. The research methodology is based on the use of general scientific and special methods, in particular, analysis and synthesis, comparison, generalisation, and system-structural analysis. Scientific novelty. The essence and typification of library innovations, the goals of software for managing the library of a higher education establishment and the specifics of managing the process of library changes are clarified. The factors influencing the effectiveness of library innovation processes are outlined. Conclusions. Current trends worldwide are determined by the transition of information provision and delivery from traditional models to electronic and web formats. It is determined that the library of a higher education establishment can use artificial intelligence to provide users with alternative educational services. It has been established that the modern approach to library management is to implement innovative technologies and methods that enable the library of a higher education establishment to be efficient, accessible and convenient for users. The advantages of library automation have been identified. Implementing innovative technologies and methods, such as electronic resource management systems, library process automation systems, and electronic document management, enables university libraries to improve access to information and optimise management processes, as well as help predict and respond to changes in user and market needs. It has been established that developing a digital library facilitates the generation of reports that help staff obtain data on document flow. It is determined that the advantages of an integrated library system include increased productivity, reduced operating costs, improved control, improved speed, reduced errors, increased range and efficiency of administration

Keywords: modern HEE libraries; library management; innovative technologies; electronic resources; information space; information resources; optimisation; repository; digitalisation; digital resources; artificial intelligence

Relevance of the research topic

The modern library of a higher education establishment (hereinafter – HEE) is important in the lives of students, lecturers, and researchers who study new scientific areas, conduct differentiated research, among other activities. Due to the growing amount of scientific information available on the Internet, it has been established that the library of a higher education establishment should introduce innovations, new information technologies

and methods to ensure the effectiveness of its activities. In other words, libraries must constantly adapt to use technological advances and master new tools and strategies to meet the needs of users in the digital media era (Horban & Gaisyniuk, 2023). Technologies should be integrated to leverage shared knowledge and available resources, leading to innovative levels of functionality and enabling future generations to collaborate.

Suggested Citation:

Horban, Yu. (2024). Innovative technologies and methods in the management of higher education establishment library. *Library Science. Record Studies. Informology*. 20(1), 12-18. doi: 10.63009/lrsi/1.2024.12.

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In the process of management, libraries of higher education establishments face the problem of ensuring intensive, efficient processing and preservation of information received in electronic form, as well as insufficient automation of management processes, which in turn leads to delays and errors in the provision of services to users. To solve these problems, it is necessary to ensure the implementation of innovative technologies, artificial intelligence, automated library management systems, and other differentiated methods, as well as to use social media to communicate with users and promote library services. The innovative component of library activity largely depends on the technical basis of this process. The uniqueness and peculiarity of the role of libraries in public life necessitates a radical change in the scientific and practical foundations of the modern library of a higher education establishment, the search for new mechanisms for implementing strategic vectors of its development (Barabash *et al.*, 2023). Given this, it is relevant and necessary to study the peculiarities of the modern approach to the management of the higher education library, in particular the introduction of innovative technologies and methods.

Recent research and publications analysis

Only a small number of scholars have studied modern approaches and specific features of implementing innovative technologies and methods to ensure effective library management. In particular, the scientific works of V. Barabash *et al.* (2023), O. Voskoboinikova-Guzeva & N. Tereshchenko (2021ab), Y. Horban & N. Gaisyniuk (2023), O. Kolomiets & O. Golovata (2020), S. Aithal *et al.* (2016), B. Asid (2020), L. Bills (2000), C. Brundy (2015), O. Christopher & D. Yusuf (2018) reflect the study of the modern approach features to the management of the library of a higher education establishment based on the introduction and application of differentiated innovative technologies and methods.

The activity of the HEE library as a centre for the accumulation and storage of socially significant information is studied in the work of O. Kolomiets & O. Golovata (2020). The authors analyse the interaction process between the university library and users of information resources in modern conditions, which arises under the influence of the development of information technology in the library sector and education in general. O. Voskoboinikova-Guzeva & N. Tereshchenko (2021ab) consider the library of a higher education establishment (on the example of domestic and foreign institutions) as an intellectual space, a complex scientific, information, social and communication complex, a key information resource of the university that participates in modernisation processes and contributes to improving the quality of research, learning and teaching, as well as the values (ethical, socio-economic, communicative) that form the basis for building a strategic development of the library.

Analysing the current state and prospects of library development, S. Rzhechytska (2023) notes that digital optimisation of the activities of the Ukrainian HEE library, despite the slow pace of transformation, is now gaining a characteristic priority of generating an online product, so the information resources of a modern library should combine all possible formats; Y. Horban & N. Gaisyniuk (2023) emphasise that it is important for libraries to use the opportunities provided by digital technologies and adapt their services, facilities and policies accordingly.

A number of domestic researchers believe that based on educational libraries formation and development of professional information and communication environment takes place, so in the context of the new paradigm of education, the philosophy of an educational library is developing, where service activities, joint creation and use of modern information resources are prioritised (Grigorevska *et al.*, 2022).

The purpose of the article is to study and summarise the features of the modern approach to library management of a higher education establishment, which involves the introduction of innovative technologies and methods. To achieve this goal, the following tasks have been defined: to analyse innovative technologies and methods of managing an academic library and to identify the main objectives of software for managing a library of a higher education establishment.

Main research material

At the beginning of the twenty-first century, a phenomenal paradigm shift in the provision of library and information services took place around the world. The consequences of the information and communication technologies' impact on every sphere of human development are obvious, and their influence on library and information services is difficult to overestimate. New technologies and means of communication have contributed to the development and emergence of electronic services in libraries, which have become the basis for the formation of digital libraries (Esew & Ikyembe, 2013). Current trends worldwide are determined by the transition of information provision and delivery from traditional models to electronic and web formats (Christopher & Yusuf, 2018). Thus, the vision of a library of a higher education establishment is impossible without interactivity, which is based on the values of openness, accessibility, innovation, and service, as well as multifunctionality, convenience, and networking (Esew & Ikyembe, 2013).

The modern approach to library management is to implement innovative technologies and methods that enable the library of a higher education establishment to be efficient, accessible and user-friendly. In turn, the library enhances the competence of members of the university community by expanding the offer of resources and services, information and media education

(Voskoboynikova-Guzeva & Tereshchenko, 2021a). Currently, the process of library management faces unpredictable challenges in the information technology age, in particular, in providing differentiated information services to users. The existing principles of library management are becoming ineffective, so libraries need to assess and measure the impact of information technology on them, which in turn will improve the quality of services.

In the early 1990s, HEEs began the process of library automation, collecting and reporting data on academic library operating costs, staffing, and collections for accreditation and annual reports. To properly support their role, academic libraries' content offerings go far beyond the books on the library shelves and offer vast collections of scholarly articles and digital materials such as photographs, documents, or manuscripts, managed by an integrated library system

or ILS, combined with online catalogues to show a fraction of the total collection or library collections.

Library automation can be defined as the use of computers to perform traditional library operations such as acquisitions, circulation, cataloguing, and reference and serials control. Automation is used to reduce the amount of time staff spend on repetitive activities that must be performed in any well-functioning library. In addition, library automation is a way to restructure its functions and rethink its services to adapt the institution to the new conditions and needs of the academic, teaching, and learning community. If the modernised library and information centre are properly planned and implemented, the automation of the HEE library should unite and help students to become skilled information users and promote their lifelong learning (Asid, 2020). Table 1 shows the innovative technologies and methods used to manage the library of a higher education institution.

Table 1. Innovative technologies and methods for HEE library management

Innovative technologies and methods	Description
Electronic resource management system (ERMS)	ERMS is a software that enables an HEE library to manage electronic resources such as databases, e-journals, books, etc., as well as to store, control and provide access to electronic resources and monitor their use.
Integrated library systems (ILS)	ILS is software that enables the library of a higher education establishment to manage the catalogue of books and periodicals, book orders and other processes. This innovative technology enables the library to improve information processing and retrieval, reduce processing time, and optimise the user experience.
Virtual libraries	A virtual library is defined as an online service that provides users with access to the library's electronic resources, enables them to quickly and conveniently find and obtain the information they need, and allows them to make requests for documents from any location with an Internet connection.
Organising electronic document management	Electronic document management is defined as the process of exchanging documents between differentiated departments of a library using electronic means. This technology allows the university library to process documents quickly and conveniently, reduce processing and storage time, store data electronically and reduce the cost of printing and storing paper documents, as well as allows for a high level of confidentiality and security of document processing.
Interactive technology applications	Allows users to use the library conveniently and efficiently based on the developed and implemented interactive screens, audio guides, tips and other tools.
Artificial intelligence technology implementation	AI ensures the efficient operation of the library based on the developed systems that are endowed with the functions of providing recommendations to users regarding literature based on the analysis of their interests and previous requests. AI also assists librarians in the automatic distribution of books and procurement planning.
Using multimedia tools	To ensure efficient and effective learning of new information, librarians create video and audio materials and develop virtual expositions that allow library visitors to learn about interesting topics and materials.
Using speech processing technology	Some higher education libraries are using voice-activated tools to help search and navigate the library catalogue and are developing systems that automatically translate texts from one language to another, which is again a positive trend for those higher education institutions with international students.
Using information and analytical systems	These systems enable the analysis of statistics on the use of library resources, user behaviour, and other indicators that allow librarians to make decisions about how to improve their work.
Using electronic catalogues and databases	It allows users to find the materials they need quickly and efficiently, and librarians can provide access to databases containing scientific articles, e-books, videos and other scientific resources.
Using virtual tours	Libraries use virtual tours to allow users to get acquainted with the institution and its services, which in turn can be especially useful for new users who do not know how to use the library of an HEE.

Table 1. Continued

Innovative technologies and methods	Description
Mobile applications	Libraries of higher education establishments develop mobile applications for using the services of the university on a mobile device.
Extended services and applications	HEE libraries can introduce differentiated programmes and services that meet the needs of users, such as readers' clubs, lectures, workshops, meetings with writers, etc.

Source: compiled by the author based on A. Llewellyn (2019), M. Naveed *et al.* (2021), R.O. Okunlaya (2022), L. Pellack (2022)

The implementation of innovative technologies and methods, such as electronic resource management systems, library process automation systems, and electronic document management, enables higher education libraries to improve user access to information and optimise management processes and can help higher education libraries to anticipate and respond to changing user and market needs.

One of the technological innovations of digital transformation that a university library can use to provide users with alternative educational services is artificial intelligence. This technology helps to make the right decisions for obtaining and sharing information, teaching and research. However, even though generative artificial intelligence can revolutionise not only the work of libraries but also any activity, the available literature confirms the low level of using this technology by university libraries to provide innovative alternative services (Okunlaya, 2022).

Integrated library systems (ILS) are designed to manage the library of a higher education establishment, but the process of managing electronic resources is a rather difficult task for ILS. In order to overcome these problems, ILS vendors are working on next-generation library catalogues to provide a single search interface. New generation library systems are compatible with

resource description and access (RDA), where specific features of library systems include cloud-based, authorised login and unified workflows, knowledge base, electronic resource and licence management; they are superior to older ILSs and take some time to reach their peak (Yang, 2013).

The integrated library system was to be used to make it easier for libraries to carry out their processes faster and more accurately, to make libraries keep records and to help them generate the necessary reports (Bills, 2000), which in turn improved and revolutionised the library process, in particular, acquisition, cataloguing, circulation control, book reservations, online catalogues and many other services became more efficient compared to the manual system. In addition, several other benefits include increased productivity, reduced operating costs, improved control and speed, reduced errors, and increased range and depth of administration (Kochtanek & Matthews, 2002; Naveed *et al.*, 2021). The SIMS (Srinivas Institute of Management Studies) library has a Windows-based higher education library management software developed by a team of experts and library professionals to perform the main functions of the library and to meet the user's needs. Figure 1 illustrates the main goals of HEE library management software.

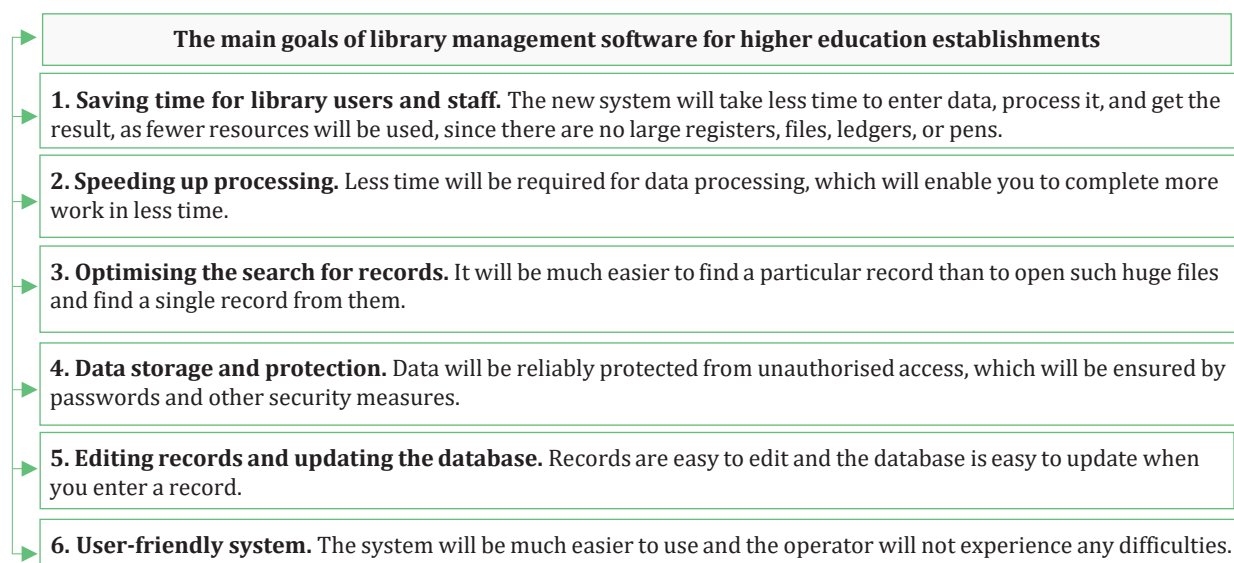


Figure 1. The main goals of library management software for higher education establishments

Source: compiled by the author based on S. Aithal *et al.* (2016)

The SIMS library system should provide information such as the availability of a particular book by title; the availability of a book by a particular author; the availability of a book by barcode number; and the number of available copies of the required book. The library management system of the HEE should also be able to generate reports on the documents available in the library, so appropriate printouts should be created for each record (loan/return) made in the system. The system should provide security provisions such as “Authenticated Login”, where everyone will have a user ID and password; a record of system users should be kept in a log, and complete backup and restoration of the system should be provided (Aithal *et al.*, 2016).

Managing a library in a higher education establishment is defined as a labour-intensive process where librarians are responsible for day-to-day activities, ensuring the safety of resources, meeting the readers' demands for books they need, etc. One of the important features of an automated library system is the management module, which helps to organise and administer key operations where librarians no longer need to catalogue books or track circulation activities manually. The system can also automate the actions of an external user, allowing students to easily access materials and not face any procedural delays. On the other hand, sometimes forgetting to return books within a set time frame can cause problems, so the software sends notifications to users reminding them of the return date or overdue dates.

The creation of a digital library facilitates the generation of detailed MIS reports, which helps staff obtain data on book circulation and information related to the production and submission of publications. In addition to integrating OPAC (Online Public Access Catalogue), the digital library of a higher education establishment has a digital catalogue that helps users search for

books, journals, and other various reading materials, and M-OPAC (Mobile – Online Public Access Catalogue) allows readers to do the same by entering the name and title of the author (Poonam, 2023).

Thus, digitalisation helps to expand the capabilities of the automated library system, which enables the optimisation of basic administrative activities, providing library staff with the ability to work efficiently.

Conclusions

Based on the conducted analysis, it can be concluded that the introduction of innovative technologies and methods is a prerequisite for ensuring effective management of the library of a higher education establishment. At present, the library of a higher education establishment has to meet the needs of students and lecturers in access to up-to-date and relevant information, as well as manage resources and services through the use of innovative technologies and methods. Thus, effective management of an HEE library includes both providing access to the necessary research and educational information and understanding the needs and requirements of users, analysing data and planning strategies, which in turn involves the efficient use of resources and high-quality library services.

The research findings can be used in differentiated areas related to library work, education and innovative technologies that will increase the efficiency and productivity of the university library, improve the quality of user service, and reduce time and resources spent on routine work. The results of the study can have a significant impact on improving library services and the process of library management in higher education establishments. Further research can be aimed at determining the impact of innovative technologies and methods on the quality of user service and the effectiveness of resource management in HEE libraries.

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Інноваційні технології та методи в управлінні бібліотекою закладу вищої освіти

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Анотація. Мета статті – дослідити та узагальнити особливості сучасного підходу до управління бібліотекою закладу вищої освіти, що передбачає впровадження інноваційних технологій і методів. Методологія дослідження базується на використанні загальнонаукових і спеціальних методів, зокрема аналізу та синтезу, порівняння, узагальнення, системно-структурного аналізу. Наукова новизна. З'ясовано сутність і типізацію бібліотечних інновацій, цілі програмного забезпечення для керування бібліотекою ЗВО та специфіку управління процесом бібліотечних змін. Окреслено чинники, що впливають на ефективність бібліотечних інноваційних процесів. Висновки. Сучасні тенденції в усьому світі визначаються переходом надання та доставки інформації від традиційних моделей до електронних і вебформатів. Визначено, що бібліотека ЗВО може застосовувати штучний інтелект для надання користувачам альтернативних освітніх послуг. Встановлено, що сучасний підхід до управління бібліотекою полягає в імплементації інноваційних технологій та методів, які надають змогу бібліотеці ЗВО бути ефективною, доступною та зручною для користувачів. З'ясовано переваги бібліотечної автоматизації. Імплементація інноваційних технологій і методів, таких як система управління електронними ресурсами, системи автоматизації бібліотечних процесів та організація електронного документообігу, надає змогу бібліотекам ЗВО покращити доступ до інформації та оптимізувати процеси управління, а також допомогти прогнозувати та відповідати на зміни потреб користувачів і ринку. Встановлено, що створення цифрової бібліотеки сприяє формуванню звітів, які допомагають персоналу отримати дані щодо документообігу. Визначено, що до переваг інтегрованої бібліотечної системи належать підвищення продуктивності, зниження вартості експлуатації, покращення контролю, покращення швидкості, зменшення помилок, збільшення діапазону та ефективності адміністрування

Ключові слова: сучасні бібліотеки ЗВО; управління бібліотекою; інноваційні технології; електронні ресурси; інформаційний простір; інформаційні ресурси; оптимізація; репозитарій; цифровізація; цифрові ресурси; штучний інтелект