Librarians as High-Impact Research Data Experts

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Abstract. High-impact research data assessment can be performed by librarians because they have more knowledge and understanding of managing scholarly publications and research data compared to staff in other departments and are able to identify the research cycle. The role of librarians in the field of library management is constantly evolving. With the increasing importance of big data, organizations are facing a major challenge in storing, managing, analyzing, and using large data sets. In addition, the establishment of data science programs at institutions has meant that librarians must adapt and integrate growing expertise in management, accessibility, and technology to support data scientists. With their expertise and knowledge in data management, analysis, and preservation, librarians are increasingly seen as potential candidates for the role of chief data officer. The result of this report is an analysis of the need for librarians and the expertise that is a priority in the organization, as measured by variables that are the main key, namely, the 7 main megatrends that have a great impact on the analysis, i.e., the 7 key trends that have the greatest impact on this analysis. The results of this study show that the ability of library managers to manage scholarly research data has been demonstrated through their involvement as intermediary librarians or knowledge management officers (KMOs) in faculty, research groups, research consortia, rating audits, institutional hierarchy secretariats, and other needs at the university, organizational, and international levels. This role has also been shown to contribute to the development of a better scientific community, whether as infrastructure developers, setting new policies, working on data governance, effective data integration, training and promotion, and more.
Keywords: Data management, librarianship, information and knowledge management, informational behavior.

1   Introduction

Librarianship is expected to be one of the top 10 occupations in 2030. Research findings in an article in the Job Outlook 2030 report on the 10 occupations that will be needed in the future in the U.S. and U.K. found that librarians, curators, and archivists will be among the most in-demand occupations in 2030, ranking 9th overall among more than 700 other occupations. The result of this report is an analysis of the need for librarians in the organization and the expertise that is a priority in the organization, as well as measured by variables that are the main key, namely, the 7 main megatrends that give a great impact on the analysis, namely: i. the pace of new technologies, including improvements in automation; ii. globalization; iii. demographic change; iv. environmental sustainability; v. urbanization; vi. Increasing imbalances; and vii. political instability. Librarians possess many essential qualities that can make them excellent candidates for the role of Chief Data Officer. With their experience in information management, librarians have a unique understanding of data and how it can be used for decision-making. They also have expertise in collecting and analyzing data to improve information services, which makes them ideal for working with large data sets. As the importance of big data continues to grow, it is imperative for organizations to have individuals who possess valuable skills in data management and analysis. Librarians' knowledge and skills in data management, analysis, and preservation make them natural candidates for this role. Librarians' experience managing large amounts of data, their technical expertise, and their ability to organize information predestine them for the role of chief data officer. As the role of librarians continues to evolve, they are now working as digital services managers and data scientists. With their extensive experience in managing and analyzing data, librarians have the potential to be effective chief data officers who can ensure that organizations can harness the full potential of data to make informed decisions. Librarians can also play a critical role in fostering a culture of data-driven decision-making in organizations. Librarians can identify organizational challenges, develop strategies for using data to address those challenges and ensure that data is collected in a way that supports the institution's decision-making.

2   Literature Review

2.1 Libraries and librarian

Librarianship management is a multifaceted field that encompasses the leadership, administration, and operation of libraries. The management of libraries requires a diverse range of skills and competencies. While technical skills are important, including the management of information resources and proficient use of information tools, it is also crucial for librarians to possess strong interpersonal communication skills, leadership abilities, and a compassionate understanding of the role of libraries in society. Moreover, contemporary library managers are increasingly valuing general and personal skills over traditional librarianship skills. Effective library management is critical to the success and sustainability of libraries. The management of research efforts nowadays has changed, and many research efforts can be carried out through electronic

methods such as electronic science (e-science) and electronic research (e-research). This method has begun to take over the publication method based on the open-access method in published scientific publications. This situation has forced higher education institutions to reconsider the role of libraries and librarians in research data management to provide more appropriate services to the community or users (Corral, 2012). Razib's view in 2015, in his writing, was that today's digital library has stimulated users, institutions, and organizations to further improve their ability to manage the implementation of new services, the reorganization of organizations, the functions of the role of librarians, and the needs of library use (Karno, 2015). Through a survey made by Semeler & Pinto in 2019, it was noted that the library nowadays needs to be more user-friendly, and it is seen that it is necessary to understand the needs of users in meeting the needs of customers, especially in the implementation of digital services. Librarians or trained information management officers are also able to assist researchers who need guidance in various aspects of scholarly research and publishing, particularly with regard to information data. Librarians' expertise in managing data in the research lifecycle and in providing accurate research information guidelines enables collaboration with research groups on data science methodology as well as the creation of a good and effective scientific society (Semeler & Pinto, 2019). Today's librarians are also considered capable of many interpersonal skills such as teaching, user awareness, service orientation, and persuasion. That being said, a librarian's career in the library today includes high-level cognitive skills such as solving complex problems, disseminating original ideas, and continuous learning. Given the increasing demand for research data and information management, the role of librarians in providing effective services is very important. Currently, there are several academic libraries that give priority to librarians helping research groups (faculties) with research. In the meantime, there are those who work full-time either as trained librarians or as information management experts to provide the relevant services (Federer, 2018). Librarians' careers were identified by the change in seven major trends (Chart 1). This can be seen in the competency of librarians to develop expertise in academic areas such as scholarly information review, information data management, metadata standards, bibliometrics, data mining, citations, impact journals, and others. The development of this career also makes the librarian the main arbiter in the middle of the "field" in determining the validity of the data in the highest class and a reference for excellent research.

No	LIBRARIAN TASK	WORK	EXPERTISE
1	Research Publication	Malaysia Research Assessment and Ranking	Scholarly Publication, citation, Impact factor, H-Index, Internal audit, Research Grant, quadrille rank, research writing, etc
2	Library Automation	User Requirement system, Database Online, Portal web,	Integration, Data Management, database management, Application system, Content

		Blog, Library management system, Repository	Management, System analysis, Open source
3	Bibliographic material	Acquisitions, cataloging, classification, Metadata management, user services, etc	budgeting, MARC21, RDA, DDC, LCSH, LCC, metadata management, weeding, authority control, etc
4	Library Services	Reference, literacy, readers advisory, interlibrary loan, orientation tours, collection, accessibility, etc	Information retrieval, resources, scholarly pub, databases, boolean, search terms, collection development, subject areas, information literacy, knowledge inform decision making, communication skills, etc
5	Special collection archives	Preservation and conservation, collection development etc	Manual and digital preservation, outreach and exhibitions, copyright and intellectual property, collaboration and partnership
6	Open Science	Open Access pub, open data, repository management, etc	Scholarly communication, research data management, open educational resources, altmetrics, research lifecycle, etc
7	Library administration	Policy, budgeting financial, personnel, facilities, collection development, technology integration, collaboration, user services, etc	policies and procedures, quality audit, ISO 9001:2015, expenditures resources, recruitment, training, supervision, building assets and facilities, digitalization, advocacy and outreach, etc

Chart 1: Librarian task, work and expertise

2.2 Future Librarian: Improvement of ICT, big data, and scientific data

Advances in information and communication technology (ICT) provide professional development opportunities for librarians. The primacy of MARC tag (Machine Readable Cataloguing) expertise, which provides a uniform standard for all bibliographic tag data, is a great advantage for librarians. This expertise enables a complete data dictionary that only librarians understand to provide quality information and structured data management. This skill also provides librarians with the opportunity to participate

directly in the development of library management systems and become an important asset in the developing careers of information technology librarians (Library of Congress, 2003). Specialization in other ICT areas such as open source, IoT development, document management systems, library application systems, CMS development, infrastructure, and network security also requires the involvement of librarians, although not to the full extent. The development of innovation based on the advancement of data technology has also led to a skills shortage in various industries. The reliance on data collection, data analysis, modeling, and the application of large data sets is known as the scientific community (Graph 3), or the knowledge of data science, which enables an organization to be more successful, efficient, effective, and generate higher profits (Porter, 2015).

This was also noted by Procter and Voss in 2009, where they noted that the growth of ICT will have an impact on the need for library services at the higher education institution level. It is expected that there will be major changes in line with this development, leading to an increase in services for more effective management of scientific research data. Librarians who have knowledge and expertise in managing research data will be highly valued in the future (Corbett et al., 2014). With the continued growth of data in the digital environment, librarians with this expertise will help researchers or other professionals manage research datasets. It is also expected that librarians will be more inclined to meet the needs of users in more thorough information searching, that librarians will be more thorough in the procedures and work processes of broader searching, and that a new mix of hybrid information management methods will emerge where the bridge can be built between the application of ICT expertise and the latest needs of users in searching for new information (Procter and Voss, 2009). This is because the amount of data being generated by researchers and institutions continues to increase exponentially. (Neshcheret et al., 2019) Therefore, librarians must develop competencies to support research data management effectively. Big data in librarianship is an opportunity to develop the careers of librarians in the future. Big Data is an emerging field related to new technologies that can store data management in large quantities, where potential librarians are not only data managers but also data analysts, transforming the data into a form of information that can help in decision-making in the organization. The clear skill set of the librarian in this matter is that of a data manager, collecting, managing, storing, curating, analyzing, reporting, visualizing, and further protecting the information. The role of librarians also needs to be improved, especially in terms of statistics and knowledge of information technology, so that librarians can be used as analytical librarians (Narendra, 2016). The librarian's understanding of the integration of materials retrieval, international protocol Z39.50, open scientific research metadata, research support services, digital documents, and those related to systematic data collection make the librarian a suitable candidate for the Certified Data Assistant (Data Steward) designation. A librarian is a personality who can influence the data obtained and stored using the method of accurately determining keywords and high-quality data collection standards. This is a very important requirement for a data steward in

the future, as most organizations are data-driven to make accurate and more profitable decisions.

The role and function of academic libraries are also mentioned repeatedly in Zhan & Widén's (2017) study, where data science is seen as a catalyst for the rise of this new technology: "Big Data is changing the way libraries perform their normal tasks". Therefore, librarians need to learn and master this new knowledge in order to meet the needs of the concerned users (Eclevia et al. 2019). Librarians also better understand the definition of research operations tasks related to higher education research publication data, e.g., for high-level higher education research audit requirements (MyRA), scientific information data and online database needs for CPM data quality improvement scoring (MyMOHES), and data management for instrument rating (EQUAL). High-impact research data assessment can also be performed by librarians, as they have more knowledge and understanding of managing scholarly publications and research data compared to staff in other departments and are able to identify the research cycle.

2.3 Librarian as a data manager

With the advent of big data, organizations are facing a major challenge in storing, managing, analyzing, and using large data sets. As a result, the role of the chief data officer has become increasingly important. One group of professionals with the skills and expertise to meet this challenge are librarians. These information management experts are well-suited to meet the growing demand for analytical talent and skills. According to the Federal Big Data Research and Development Strategic Plan, librarians are recognized as experts who can manage, manipulate, and preserve data sets. In addition, the establishment of data science programs at institutions has meant that librarians must adapt and integrate growing expertise in management, accessibility, and technology to support data scientists. Professional associations and information science programs play a critical role in improving librarians' education in data management and analysis to prepare them to use big data to answer questions from colleagues and patrons. Because librarians have a high level of expertise in technical processes and information services, they can provide valuable assistance to researchers in locating information resources, managing data, and accessing needed resources. As the amount of available data increases, so does the need for efficient management and analysis. In this context, librarians have an important role to play in data analysis and decision-making. Librarians have numerous skills and expertise in data management, information technology, and analytics to meet the demands of big data. The Obama administration's Big Data and Research Program recognizes librarians as experts who can "meet "the growing demand for analytical talent and skills" in managing and preserving data sets. In addition, their experience in managing and organizing information, providing reference services, and maintaining digital collections makes them a natural fit for the role of chief data officer. Librarians are ideally suited for the role of Chief Data Officer because of their technical skills, expertise, and knowledge of data management (President Barack Obama's Administration Launches Big Data Initiative ..., n.d.). As chief data officers, librarians can ensure that organizations harness the full potential of data to make informed decisions. They can also foster a culture of data-driven decision-making

within organizations by working to identify organizational challenges and developing strategies for using data to address those challenges. This involves ensuring that data is collected in a way that supports effective analysis and decision-making, as well as providing guidance on data management and best practices.
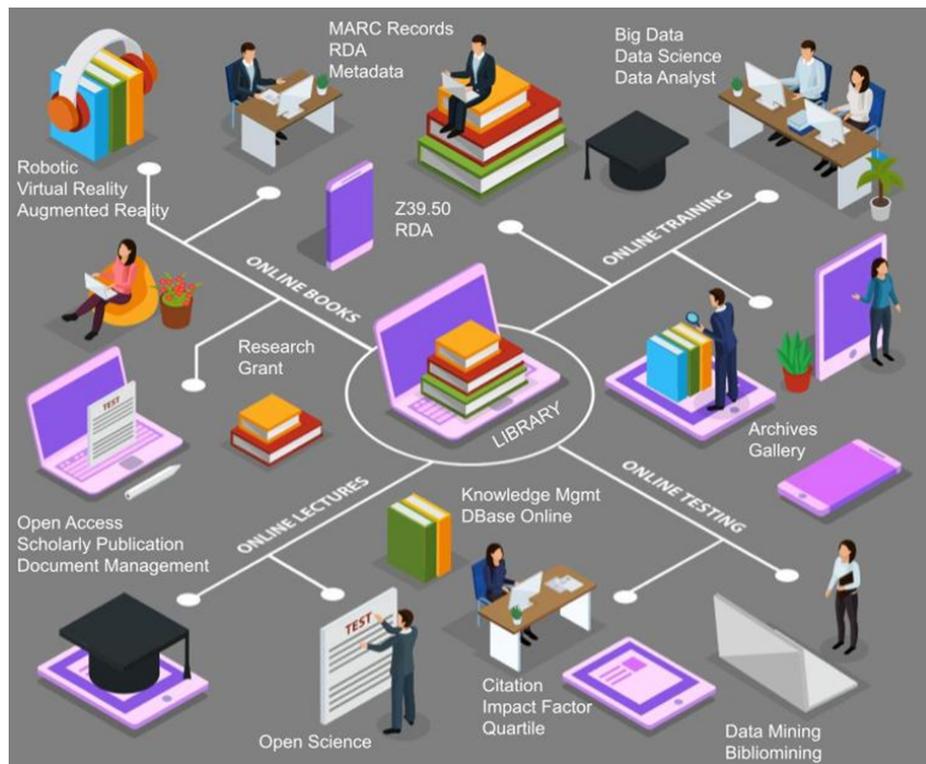
Chart 2: future library environment

In today's data-driven world, the role of librarians is constantly evolving. With their expertise and knowledge in data management, analysis, and preservation, librarians are increasingly seen as potential candidates for the role of chief data officer. Librarians' skills in collecting, managing, analyzing, and preserving data are essential to the success of today's organizations seeking to make informed decisions based on large data sets (Carlson, 2013). Librarians' experience managing large amounts of data, their technical expertise, and their ability to organize information predispose them to this role. In addition, librarians can also play a critical role in fostering a culture of data-driven decision-making in organizations. In addition, Jin et al. have emphasized the importance of clear communication and efficient use of big data in organizations that want to be successful with their projects. As such, librarians can best ensure that data is captured in a way that supports business goals while removing potential obstacles. As data management experts, librarians can help develop and implement effective data management strategies that promote best practices for preserving, organizing, and analyzing large

data sets (Committee, 2018). Librarians can work to identify organizational challenges, develop strategies for using data to address those challenges and ensure that data is captured in a way that supports business goals (Mabunda & Plessis, 2022) and allows organizations to gain a competitive advantage in their respective fields. In summary, librarians' information management skills and expertise make them valuable candidates for managing big data as chief data officers. Their knowledge and experience in managing data resources, providing reference services, and organizing information can be used to support data-driven decision-making in organizations.

3   Conclusions

The ability of librarians to manage scholarly research data has been demonstrated through their involvement as intermediary librarians or knowledge management officers (KMOs) in faculty, research groups, research consortia, rating audits, institutional hierarchy secretariats, and other needs at the university, organizational, and international levels. The role of librarians has also been shown to contribute to the development of a better scientific community by participating in the development of open science, whether as infrastructure developers, setting new policies, working on data governance, effective data integration, training and promotion, and more. Librarians also have another side that is important in today's scientific society, namely their credibility as versatile and trusted information stewards when reviewing high-quality data. Continuing the librarian's role as a special steward of university scientific data and understanding the needs of structured data completes the skills of this field in managing various university data.

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