MOLDOVA STATE UNIVERSITY

DOCTORAL SCHOOL OF SOCIAL SCIENCES

CONSORTIUM:
Moldova State University (USM), "Bogdan Petriceicu Hasdeu" State University of Cahul (USC),
National Intelligence and Security Centre "Bogdan, the Founder of Moldova"

Manuscript
UDC: 027.7:001.891(043.3)

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THE ROLE OF ACADEMIC LIBRARY IN RESEARCH DATA MANAGEMENT

Specialty 572.02 – Infodocumentation; Library and Information Sciences

Abstract of PhD Thesis in Communication Sciences

CHISINAU, 2025

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Public defense will take place on the 20th of June 2025, at 12.00, in the public Meeting of the Doctoral Thesis Examination Committee within the Doctoral School of Social Sciences, Moldova State University, 60, A. Mateevici Street, academic central building, hall 416, MD-2012, Chisinau, Republic of Moldova.

The doctoral thesis and summary are available for consultation at the National Library of the Republic of Moldova, the Central Library of the Moldova State University, and on the website of the National Agency for Quality Assurance in Education and Research (https://anacec.md/).

The summary was sent on the 6th of May, 2025.

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CONCEPTUAL FRAMEWORK OF THE RESEARCH

Relevance and importance of the topic. The relevance of this topic is highlighted by the significant transformations in the contemporary research landscape, characterized by the exponential growth in the volume and complexity of research data. In this context, academic libraries play a central role in managing and providing access to this data, directly influencing the efficiency and quality of research.

Currently, Research Data Management (RDM) is a major challenge for research and development organizations becoming a strategic priority for universities and research institutions. The widespread use of information technologies within different scientific disciplines has conditioned the increase in the number of researchers who generate and frequently use datasets as part of the research process. Effective data management is essential for high-quality research, facilitating data exchange, ensuring long-term accessibility and durability, and enabling future reuse for new discoveries. The rapid increase in the volume and diversity of digital research data underscores the need for scientific institutions to develop policies, infrastructures, and services that support researchers in creating, storing, organizing, and preserving datasets.

The *UNESCO Recommendation on Open Science*, adopted in 2021, promotes open access to scientific knowledge, including research data, through robust open data infrastructures and collaborative research practices that enhance transparency. UNESCO underscores the importance of an open and inclusive scientific ecosystem that mitigates disparities in knowledge access while fostering innovation and sustainable development (UNESCO, 2021).

The *Association Agreement between the Republic of Moldova and the European Union* offers significant opportunities to strengthen scientific and technical cooperation and facilitate the exchange of information within the European research, development, and innovation area. In this context, harmonizing policies - particularly those concerning research data management - is essential for aligning Moldova's research landscape with European and international standards and best practices.

In the context of integrating the concept of open access into the European research landscape, with the aim of maximizing the impact of publicly funded scientific research, research institutions and researchers are encouraged to adopt the principles of open data sharing. Open science, an extension of open access, has the potential to accelerate knowledge advancement and facilitate knowledge circulation. Recognizing its strategic importance, the European Commission has made open science a priority, as reflected in the EU Framework Programmes, Horizon 2020 and Horizon Europe (2021-2027) - the largest research and innovation initiatives at the European level (European Commission, 2016; 2021). To support this vision, a flexible pilot action for open access to research data has been launched within these programmes, aiming to enhance access, promote reuse, and maximize the impact of research data generated by EU-funded projects.

The legal requirements for projects participating in this initiative are outlined in the grant agreement, which mandates that beneficiaries develop a data management plan (DMP) and deposit their research data in a recognized repository. This ensures that data can be accessed, used, reproduced, and disseminated freely, maximizing its impact across the scientific community.

Moreover, the need for effective research data management implementation within institutions is reinforced by the policies of funding agencies and research councils, which increasingly require researchers to submit grant applications alongside a DMP and to adhere to

data management and sharing standards. By promoting open access to publicly funded research data, these requirements enhance the return on public investment, foster scientific integrity, and enable the full potential of emerging technologies and digital networks to be leveraged for research and innovation.

The implementation of data management mandates has driven academic libraries to expand their role by developing research data services tailored to the needs of researchers, faculty, and students. In response to technological, political, economic, and social shifts, libraries are introducing new services that align with evolving national research policies and the growing influence of data-driven science in the digital era.

Recent technological advancements, including e-research and open access, have reshaped modern research practices, influencing both the methodology of conduct of scientific activities and the dissemination of findings. While these changes offer numerous advantages, they also introduce distinct challenges. In this evolving landscape, the ability to conduct high-quality research and effectively manage vast volumes of scientific data becomes essential.

University librarians play a pivotal role in this transition. As experts in long-term institutional memory preservation and active contributors to education and training, they are uniquely positioned to equip researchers with the necessary skills to fully harness the potential of emerging research paradigms.

In this context, a study on the role of libraries in the Republic of Moldova in research data management is of great relevance for both library professionals and research and development managers. By examining the current practices, challenges, and opportunities faced by academic libraries in Moldova, this research can provide valuable insights into how these institutions can enhance their support for researchers and align with international best practices in open science and data management.

The degree of investigation of the topic is well established at the international level, with numerous specialists in library and information science - such as Lyz Lyon, Carol Tenopir, Andrew Cox, Stephen Pinfield, Angus Whyte, Jane Tedds, and E. Verbaan - analyzing the role of libraries in research data management. These experts emphasize that libraries, given their expertise in organizing and preserving information, are natural partners in the RDM process. Their works define research data management in libraries as both a distinct research field and a practical service aimed at supporting the academic community in: designing and creating research data, ensuring data security and long-term preservation, and facilitating access, distribution, and reuse of data.

Models of research data management services for libraries are well-documented in the literature, with key contributions from researchers such as Sheila Corrall, Martin Lewis, Lyz Lyon, Sarah Jones, Graham Pryor, Angus Whyte, Stephen Pinfield, and Andrew M. Cox. These scholars propose various services that libraries can offer to support researchers in managing research data, and they also describe how libraries can play a role at different stages, taking as a basis the research cycle model.

Additionally, researchers such as Martin Lewis, Angus Whyte, Jane Tedds, Q. Zhou, Natalia Redkina, M. Henty, Chuck Humphrey, Kristin Briney have analyzed the theoretical foundations, concepts, and definitions of research data and data management. The importance of context in research data management is also highlighted by scholars like Christine Borgman,

Graham Pryor, Besiki Stvilia, Juleah Swanson, and Amanda K. Rinehart, who explore how research data fits within the broader framework of academic research.

In terms of data life cycle models, Kristi Miller, Matthew Miller, Maarit Moran, and Boya Dai have developed and presented concrete models that outline the various stages of the data life cycle, offering practical frameworks for managing data from creation through to dissemination.

However, the topic of research data management within libraries has been less explored in the local research context. Only a few researchers from the Republic of Moldova, including Dr. hab. Nelly Turcan, Dr. Igor Cojocaru, Mihai Grecu, Viorica Lupu, Rodica Cujba, and Andrei Rusu, have addressed this field, marking a gap in the literature that warrants further investigation and development.

Based on existing studies and findings regarding the state of research data management, we have developed our own approach to how academic libraries can engage in this process. This approach enabled us to identify and address a **significant research problem**: *clarifying and consolidating the theoretical foundations* regarding research data and their management. A comprehensive conceptual framework for implementing research data management in academic institutions in the Republic of Moldova was also outlined. This framework emphasizes the core role of academic libraries in the management process, offering new perspectives and models for organizing and sharing research data. These research efforts contributed to the clarification of the competencies librarians need to acquire in order to become qualified data managers and active advocates of open science. Additionally, we proposed a practical model for research data management services, tailored to meet the specific needs of academic institutions in the Republic of Moldova.

The purpose of this research is to analyze and define the role of academic libraries in Research Data Management by identifying the strategies, practices, technologies, and competencies required to support researchers effectively, as well as to propose solutions for enhancing the capacity of academic libraries within the context of open science.

To achieve this purpose, the research is guided by the following specific **objectives**:

- Analyzing theoretical and conceptual approaches to Research Data Management;
- Examining the role and significance of academic libraries in RDM;
- Evaluating existing library practices and services related to RDM;
- Identifying the needs and requirements of both libraries and the academic community in RDM;
- Developing a model for library support services in RDM;
- Identifying the essential competencies required by librarians in RDM;
- Investigating librarians' perceptions and attitudes toward RDM services;
- Assessing researchers' opinions in the Republic of Moldova on open research data and data sharing;
- Proposing recommendations and strategies to enhance and optimize the role of academic libraries in RDM.

The research hypothesis states that implementing a research data management system in academic libraries in the Republic of Moldova will enhance the quality, accessibility, and

reusability of research data, thereby advancing open science and fostering a more efficient and participatory research ecosystem within academic institutions.

This hypothesis is based on the premises that efficient management of research data is very important in the context of an increasing volume of scientific data, that academic libraries possess the expertise and resources necessary to support researchers in RDM, and that promoting transparency and open access to research data strengthens a culture of responsible and collaborative research.

Synthesis of the research methodology and justification of chosen research methods. The scientific study included an integrative approach, combining various research methods to provide a comprehensive and multidimensional analysis of the subject. In this respect, general scientific methods such as scientific documentation, analysis, synthesis, comparison, induction, inference, and structural and structural-functional approaches were used. This methodological diversity allowed a detailed examination of various aspects of research data management and highlighted the complex connections between them. To enhance the credibility and reliability of the findings, the study also adopted a triangulation approach, which involved cross-verifying data through multiple sources and methods. Furthermore, systemic analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, questionnaire survey and interview.

The scientific novelty and originality of this work lie in its significant contribution to the field of research data management, addressing a relatively new and evolving topic within university and research institutions in the Republic of Moldova. By conducting a comprehensive analysis of the role of academic libraries in RDM within the context of the digital era and open science, this study highlights their importance not only as repositories of knowledge but also as key facilitators in the management and dissemination of scientific data.

The innovative contributions of this study are reflected in:

- Addressing an emerging research field, focused on the role of academic libraries in RDM;
- Conducting a systematic analysis of the contribution of academic libraries to RDM;
- Exploring the multifunctional role of librarians in facilitating the transition to effective RDM and training them as qualified data managers;
- Developing a new model for research data management services;
- Identifying the key competencies required for librarians to provide OMC services effectively;
- Proposing innovative policies and best practices to enhance RDM in academic institutions.

Theoretical value of the research. This doctoral thesis contributes to the theoretical advancement of research data management, with a particular focus on academic libraries in the Republic of Moldova. The theoretical value of this thesis lies in exploring and defining the multifunctional role of librarians in the transition to effective research data management. The research introduces new theoretical perspectives that outline the competencies required for librarians to become qualified data managers and promoters of open science. Furthermore, it presents an original theoretical model for Research Data Management services, specifically adapted to the needs of academic institutions in the Republic of Moldova.

The thesis also explores the pivotal role of academic libraries in managing research data, integrating established theoretical perspectives with innovative organizational models. This contributes to a deeper understanding of how libraries can effectively support researchers at every stage of the data life cycle. Additionally, it underscores the importance of having appropriate infrastructure and well-defined institutional policies to ensure the efficient management and accessibility of research data.

The practical value of the doctoral research lies in the fact that it offers concrete solutions for improving research data management in academic libraries in the Republic of Moldova. The research develops a practical model of RDM services tailored to the specific needs and operational context of academic institutions in the country.

The theoretical significance and practical value of this work is reflected in its ability to equip academic library practitioners with relevant knowledge and practical tools to help them better understand the challenges and opportunities of research data management. By analyzing best practices and exploring innovative solutions, the thesis contributes to the development of effective strategies and services, ultimately benefiting the academic community.

Approval of scientific results. The results of the author's research serve both as conceptual resources and methodological tools to stimulate and support further investigations in the field of research data management. Academic libraries in the Republic of Moldova can leverage these findings to develop and implement effective RDM practices, thereby enhancing data management quality, improving information accessibility, and streamlining scientific communication within the academic community. Consequently, the study not only enriches the specialized literature but also provides a practical framework for enhancing library services to meet the evolving demands of contemporary research.

The scientific results obtained have been widely disseminated, presented, and discussed at:

- *international conferences and professional meetings*, including the International Conference “Research Data Alliance (RDA) 10th Anniversary Plenary Meeting (2023)”, the Virtual Meeting “IGAD/RDA: Sharing Experiences and Creating Digital Dialogues in Eastern Europe” (2023), the International Conference “Libraries as Enablers of Scientific Research” in Tbilisi, Georgia (2023), the International Scientific Conference “CEEE|Gov Days 2023”, Nemzeti Közszolgálati Egyetem (NIKE) in Budapest, Hungary (2023), the Regional Workshop for Eastern and Central European Countries “Access to Global Online Research in Agriculture” in Chisinau (2019), and “Strengthening the Accessibility and Visibility of Agricultural and Land Data through the Use of Semantics – AGRIS in Europe and Central Asia” in Moscow, Russian Federation (2019), the International Scientific Conference "30 Years of Economic Reforms in the Republic of Moldova: Economic Progress via Innovation and Competitiveness", Chisinau (2021);
- *national conferences and professional meetings*, including the National Dissemination Event NI4OS-Europe in Moldova (National Initiatives for Open Science in Europe), Chisinau (2021), the Conference "Open Science Tools for Researchers", Chisinau (2021), the National Scientific Conference, 2nd Edition, "Open Science in the Republic of Moldova", Chisinau (2022), the Round Table "New Roles and Functions of Libraries in the Development of Virtual Communication in the Online Environment", Chisinau (2021), the Professional Workshop "FAIR Principles in Research Data Management", Chisinau (2022), the Professional Workshop "Strengthening Regional Capacities in Implementing Research Data Management Practices",

Cahul and Balti (2022), and the Scientific Conference with International Participation "Academic Libraries in the Modern Information Environment", Chisinau (2019).

The research results have been published in 20 scientific papers, including: one paper in the international journal “Postmodern Openings”, indexed in the Web of Science database; one paper in the proceedings of the international conference Central and Eastern European eDem and eGov Days 2023 (CEEeGov 2023, September 14-15, 2023, Budapest, Hungary), indexed in the Scopus database; one paper in the IFLA Journal, indexed in both Scopus and WoS (FI 1.0); 5 articles in peer-reviewed journals in the Republic of Moldova, including Studia Universitatis. Series Social Sciences and Akademos (category B); 5 publications developed within the projects; 4 papers published in the proceedings of scientific conferences; and 3 guides.

The results were implemented in two international projects: “Enhancing awareness about open data in food and agriculture in the Republic of Moldova”, EOSC, RDA Open Call for RDA Communities of Practice (2023, role: coordinator), and “Consolidating the AGRIS National Hub in the Republic of Moldova to increase awareness about open science in agriculture and train researchers and practitioners in new trends on agricultural research”, FAO (2021, role: coordinator). Additionally, the results were applied within the national project “Stimulating the commitment of the Republic of Moldova in Open Science: methodological and application support” (2021-2022, role: project team member).

The research data resulting from the author's study have been stored in digital repositories, specifically ZENODO and the CRIS of the Technical University of Moldova (UTM).

Thesis structure: The thesis consists of 194 pages of core text, structured into an introduction, 4 (four) chapters, general conclusions and recommendations, a bibliography with 281 sources, 5 tables, 28 figures, and 18 annexes.

Keywords: academic libraries, data life cycle, research data, research data management, open science, library services.

CONTENT OF THE DOCTORAL THESIS

The ***Introduction*** outlines the relevance and significance of the research topic. It presents the study’s purpose and objectives, the research hypothesis, and a synthesis of the methodology, providing a rationale for the selected research methods. Additionally, it offers a concise overview of the thesis chapters.

Chapter 1, entitled ***Theoretical and conceptual framework of the research data management system*** consists of 3 subchapters. **Subchapter 1.1, *Theoretical approaches to research data and research data management*** examines various theoretical perspectives and conceptual foundations related to research data and their management. It presents key approaches and establishes the conceptual benchmarks for understanding the principles, practices, and challenges involved in research data management.

Definitions of research data, as identified in specialized studies, are most often provided by stakeholders involved in the research data life cycle, including higher education institutions that support and conduct research activities, journals that publish scientific findings, and research funding agencies etc. For instance, the National Science Board, which provides advisory services to the U.S. President and Congress on policy matters related to science, engineering, and education, defines research data as "any information that can be stored in digital form, including

text, numbers, images, video or films, audio, software, algorithms, equations, animations, models, simulations, etc.". The Organization for Economic Cooperation and Development (OECD) defines research data as "recorded factual material, commonly accepted by the scientific community as necessary for validating research results" (OECD, 2007). Meanwhile, Kristin Briney (2015) conceptualizes data as "anything on which an analysis is performed."

Analyzing the complex nature of data and the various definitions provided by organizations and authors, an extended and detailed definition of research data was proposed, which represents a collection of information, facts or materials collected and processed through systemic methods to generate new knowledge, validate theories and advance understanding in a certain field, being fundamental for the credibility and reproducibility of scientific results.

In the specialized literature dedicated to research data management, it is highlighted that their organization, administration and use are approached from multiple perspectives, reflecting the importance of the processes involved in the efficient management of scientific data. Therefore, research data management is an extremely complex set of activities carried out by various actors-participants in the life cycle of the research project, which requires tools, resources and infrastructure, and involves technical challenges, as well as cultural, managerial, legal and political issues.

In **Subchapter 1.2**, ***Research data lifecycle analysis***, the basic stages of the data life cycle are presented and described, from generation and collection to processing, archiving, publication and reuse. The analysis of these stages contributes to the understanding of how research data are created, managed and exploited, highlighting the importance of a structured and efficient management.

Depending on the classification criterion, different types of research data life cycle models are analyzed, including individual, organization and community-based models, as well as diverse conceptual structures, such as linear, circular and nonlinear models. This diversity of approaches reflects the complexity of the data management process and the need for flexible adaptation to the specific needs of the scientific community and research institutions.

Data lifecycle representation models are intended to help institutions articulate and refine research workflows and develop support services that enable a wide range of stakeholders to be involved in meeting data management and custody requirements. These models are also effective in implementing and supporting research data management services, as well as identifying potential data services and partnerships built in support of these services.

Subchapter 1.3, ***Characteristics of a research data management system,*** explores the essential components of an effective research data management system. These components include policies, technologies, processes, resources, and services—fundamental elements for ensuring the accessibility, reuse, and long-term preservation of scientific data.

Policies establish the regulatory framework for the collection, storage, use, and sharing of data, ensuring compliance with ethical, legal, and institutional regulations. Technologies provide the infrastructure necessary for implementing data management solutions, such as software platforms and security mechanisms that ensure data accessibility. Processes govern activities throughout the data life cycle, from planning and collection to processing, analysis, and archiving, promoting best practices and adherence to international standards. Services support researchers by

offering consultancy, infrastructure, and assistance with organization and sharing, thereby facilitating collaboration and enhancing the reproducibility of research.

A research data management system involves multiple stakeholders, including research institutions, funding agencies, journal publishers, librarians, IT services, and ethics committees. Each plays a critical role in regulating and supporting data management processes (Chen, 2017; Schmidt et al., 2016).

Chapter 2, ***Exploring the role of academic libraries in research data management,*** consists of three subchapters.

In **Subchapter 2.1**, ***The role of academic libraries in research data management***, the importance, contributions, and potential of academic libraries in the current context are analyzed. Studies carried out by authors such as Martin Lewis (2010), Liz Lyon (2012), Sheila Corrall (2012), Carol Tenopir (2019), Eddy Verbaan (2014), Andrew M. Cox and Stephen Pinfield (2014), Mary Anne Kennan (2017), Abankwa Frederick and Yuan Run (2019), and Jodi Reeves Flores et al. (2015) emphasize that academic libraries, owing to their neutral position within universities and their interaction with numerous stakeholders, play a central role in research data management. The extensive experience of libraries in collecting, systematizing, describing, organizing, and preserving information, along with their use of metadata standards and controlled vocabularies, their provision of information assistance services, and their role in fostering an information culture, positions librarians as key strategic players in this process.

Subchapter 2.2, ***Research methodology of academic libraries' research data management activity***, outlines the methodological framework employed to investigate the role of libraries in research data management. The study adopts an integrative methodology, combining different research methods. By using a range of investigation methods, we adopted a multifaceted approach that not only examines the phenomenon from various perspectives, but also strengthens the validation of our findings through data triangulation. The integration of both qualitative and quantitative methods has facilitated the development of a comprehensive analytical framework, able to address not only the theoretical dimensions of the topic, but also its practical implications, ensuring a more accurate evaluation and a more comprehensive interpretation of the phenomenon under study.

The empirical foundation of the thesis is built on four studies using sociological methods, including three surveys and one semi-structured interview. These studies were designed to explore both librarians' attitudes toward the provision of research data management services and the attitudes of researchers who are consumers of the services provided by librarians in support of the research process.

The study "Librarians' attitudes towards providing research data management services" aimed to investigate librarians' opinions and attitudes towards providing research data management services in academic libraries in the Republic of Moldova. A representative sample of 93 librarians from 10 academic and specialized libraries from the Republic of Moldova participated in the survey.

In order to examine researchers' attitudes towards the openness and sharing of research data, the author contributed to the national survey "Attitudes towards Open Science", conducted within the project 21.70105.40ȘD "Stimulating the Republic of Moldova's commitment to Open Science: methodological and applied support". The author extracted and analysed data specifically

related to research data sharing from this questionnaire. The survey targeted a diverse group, including teaching staff, researchers, administrative and managerial staff from universities and research institutions, as well as doctoral and post-doctoral students and librarians from universities and research libraries.

Another study, entitled "Agricultural researchers' attitudes towards using and sharing research data", aimed to analyze the perceptions and attitudes of agricultural researchers towards sharing research data. The study targeted the agricultural science research community in the Republic of Moldova, including researchers, teaching staff, and administrative personnel. A total of 131 respondents (n=131) participated in the survey, which represents a margin of error of 6% and covers approximately 60% of the target population.

In 2023, a complementary study was conducted, which involved qualitative data collection through one-on-one interviews with 8 university library professionals. The participants were selected on the recommendation of library directors, with the criteria of having at least 8 years of professional experience and expertise in research data management. The interviews focused on four key topics: regulations governing research data management, human resource capacities (including knowledge, skills, and training needs for providing research data management services), the technologies and infrastructures required in this field, and the collaborative partnerships that influence these activities.

Subchapter 2.3, ***Analysis of service models for research data management in academic libraries***, examines various service models implemented in academic libraries for managing research data. The impact of these models on the libraries' ability to provide innovative services and respond to the dynamic needs of the academic community regarding research data management is analyzed.

Research data management service models in academic libraries vary depending on institutional resources, research strategies, and specific user needs. The most effective models are those that are flexible, integrated into institutional policies, and capable of quickly adapting to technological advancements and emerging trends in data management.

One such RDM service model incorporates several fundamental components designed to support researchers throughout the entire data life cycle—from data generation and collection to data sharing. These components ensure that academic libraries can offer comprehensive and sustainable research data management services that cater to evolving academic and technological landscapes.

Chapter 3, ***Diagnostics of the current state of academic libraries in the Republic of Moldova in the process of research data management***, includes three subchapters.

In **Subchapter 3.1, *Peculiarities of the research data management system in the Republic of Moldova***, the current state of research data management implementation in universities and research institutions in the Republic of Moldova is analyzed. This assessment is based on the specific characteristics of the national context and examines how academic libraries are adapting their practices in line with global trends, such as open science. Additionally, it explores the attitudes of researchers toward research data, considering how these attitudes influence the management and sharing of data within the Moldovan academic and research environment.

The results obtained from several studies on research data demonstrate that the academic community in the Republic of Moldova generates and produces various types of research data. In a survey conducted by the Institute for the Development of the Information Society, researchers indicated that the most commonly produced or generated data types in their research processes are text (86.2%), images (66%), numerical data (62.6%), tabular data (55.7%), as well as other types, such as protocols, algorithms, programs, maps, and technical drawings (Turcan, 2018).

Another survey focusing on agricultural researchers found that the most frequently collected and produced data include statistical data (84.7%), experimental observations (77.9%), and tables/graphs (59.5%) (Table 1). The survey also revealed the types of data produced or used most frequently according to specific research fields: agronomic data (60.3%), productivity data (57.3%), pedological data (45%), followed by meteorological data (34.4%), socio-economic data (29.0%), marketing data (22.1%), and data on animal husbandry (20.6%) (Lupu et al., 2023).

Table 1. Types of data produced or used by agricultural researchers

Types of data	Number of respondents	Respondents, %
Statistical data	111	84,7%
Experimental observations	102	77,9%
Tables, graphs	78	59,5%
Databases, simulation software, data files	55	42,0%
Field notes	46	35,1%
Laboratory notes	45	34,4%
Photographs, films, slides, transparency films	44	33,6%
Instrumental measurements	42	32,1%
Laboratory notebooks, registers	38	29,0%
Spreadsheets	27	20,6%
Methodologies and workflows	23	17,6%
Maps	21	16,0%
Standard operating procedures and protocols	20	15,3%
Models, algorithms, scripts	18	13,7%
Questionnaires, transcripts, codebooks	15	11,5%
Cataloged specimens	7	5,3%

Source: *Lupu, Viorica, Cujba, Rodica, Sobetchi, Vera (2023).*

In the Republic of Moldova, researchers do not use a dedicated data organization system or specialized software. However, they strive to ensure data integrity, protect their research data, and maintain a logical and structured organization for efficient identification and retrieval. Researchers are responsible for safeguarding research data and primary materials, ensuring they are stored securely and can be easily accessed when needed.

The choice of file formats for data storage varies depending on the nature of the data, the type of research conducted, and the specific requirements of each field (Turcan et al., 2019). Text files are the most commonly used format (93.1%), likely due to their simplicity, ease of readability, and editability. Additionally, many researchers share their datasets in .pdf format. Although this ensures accessibility in an open format, it restricts data modification, limiting further processing or reuse.

Researchers also frequently use presentation files (83.2%), particularly .ppt and .pptx, as well as graphic and image files (67%), such as .jpg, .bmp, .tif, and .gif, to store visual experiment results or to analyze and process images. When research involves audio or video data, researchers store them in specialized formats, including .mp3, .wav, and .aiff for audio files, and .avi, .tiff, and MPEG-4 for video files. In computational science and programming, researchers use source code files to document methods and algorithms.

In terms of storage preferences, most researchers in the Republic of Moldova rely on local storage systems. Among them, 63.5% use physical disks, such as external hard drives or USB flash drives. Additionally, over a third of researchers utilize institutional computer networks and cloud storage services (Google Drive, Dropbox, Microsoft OneDrive), which provide scalable, redundant, and globally accessible solutions. These cloud-based platforms are gaining popularity as they facilitate real-time data sharing and collaboration.

Our study revealed diverse perceptions among researchers regarding the challenges and concerns associated with data sharing. While many respondents acknowledge the benefits of open data, several factors diminish their willingness to share (Figure 1).

The most significant barrier is copyright and licensing issues, cited by 55.53% of respondents (n = 443) (Turcan et al., 2022). This reluctance is often driven by concerns over potential violations of intellectual property rights and a lack of clear understanding regarding data licensing. Additionally, 36.34% (n = 161) of respondents expressed concerns about the sensitive or personal nature of their data, while 40.41% (n = 179) feared possible misuse.

Further apprehensions include uncertainties regarding data reuse by other researchers, particularly the risk of misinterpretation by different laboratories (20.77%; n = 92) and doubts about the ability of others to replicate their findings (10.84%; n = 48).

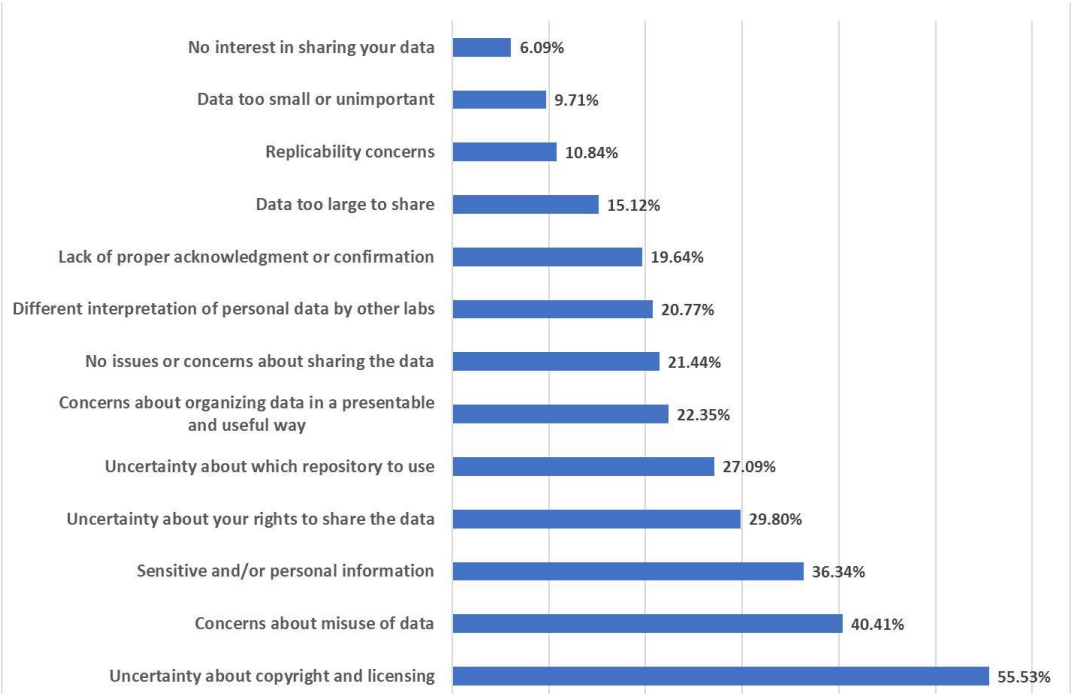


Fig. 1. Researchers' issues and concerns regarding research data sharing
Source : Lupu, Viorica, Cujba, Rodica & Sobetchi Vera (2023).

Subchapter 3.2, ***Implementation of research data management by academic libraries in the Republic of Moldova in the context of open science***, highlights the profound impact of open science on academic libraries in the country. This paradigm shift has led to substantial transformations in how these institutions operate and fulfill their mission to support research and education.

Academic libraries have taken an active role in promoting open access and enhancing the management of information resources by integrating open science principles into their activities. They support researchers by facilitating access to open publications, educational resources, and research data, thereby improving the visibility and dissemination of scientific outputs.

In the Republic of Moldova, university libraries support open access through two primary models: self-archiving in institutional repositories and publishing in open-access journals. They provide essential services for repository management, scientific journal registration, and copyright consultancy, ensuring the ethical and transparent dissemination of research findings. Through these efforts, academic libraries play a crucial role in the scientific ecosystem, fostering not only access to knowledge but also academic values centered on collaboration and responsibility.

A notable example of their involvement is the development of digital repositories based on the DSpace platform, which ensures sustainable access to institutional research output. Among the most significant repositories are those of the Technical University of Moldova (25,620 records), the State University of Medicine and Pharmacy "Nicolae Testemitanu" (23,379 records), and the State University of Moldova (13,371 records). These platforms enhance the visibility and accessibility of research results, contributing to the integration of the Republic of Moldova into the global open science framework.

As the demand for research impact assessment grows, academic libraries are evolving their services to support the scientific community in monitoring academic performance. They utilize citation analysis tools, assess journal impact factors, and assist researchers in managing their academic profiles on platforms such as Google Scholar, ORCiD, ResearchGate, and Academia.edu. In addition, they organize training sessions and workshops to optimize the use of these resources.

An essential aspect of research data management is the support academic libraries provide to researchers throughout the data lifecycle. Libraries are increasingly developing initiatives to foster an open data culture by offering consultancy services, organizing workshops, and facilitating collaboration among researchers.

The analysis of the interview "*Exploring an open approach to research data management in the institutions of the Republic of Moldova*" highlights the strategic directions of academic libraries in this process. These libraries aim to enhance data management services, promote international best practices, and continuously adapt to emerging technologies and the evolving needs of the academic community.

Thus, academic libraries in the Republic of Moldova not only facilitate access to information but also serve as strategic partners in the development of a scientific environment grounded in transparency, collaboration, and innovation.

In subchapter 3.3, ***Librarians' perceptions and attitudes on the implementation of research data management in the Republic of Moldova***, the study analyzes librarians' perceptions and attitudes regarding the implementation of Open Science and Open Data Management (OMC),

their professional training levels, their awareness of the importance of research data, and their willingness to actively engage in this process. The analysis is based on survey and interview results gathered from librarians, highlighting the perceived barriers and opportunities in developing research data management capabilities.

Key challenges identified include the lack of financial and human resources, insufficient organizational support, and the absence of national and institutional policies and regulations on open data and research data management. Other barriers include inadequate staff training, resistance to change among some librarians, increased workload, and limited collaboration between libraries and other stakeholders.

A significant obstacle is the absence of coherent policies and regulations regarding open data and RDM. The fragmentation of legislation and legal uncertainties hinder the establishment of clear guidelines for data access, reuse, and licensing. This situation discourages data sharing and impedes the development of effective initiatives. Additionally, the lack of financial resources limits the development of essential infrastructures, such as digital repositories and advanced data preservation services.

Another challenge is the insufficient training of librarians. The lack of formal training programs forces librarians to rely on self-education through international resources. While there is a strong interest in developing RDM skills, the limited technological infrastructure and the absence of adequate software solutions complicate the implementation of these services.

Resistance to change hinders the integration of Research Data Management (RDM) into the operations of university libraries. Some librarians view this area as an additional task, and the existing heavy workload discourages them from taking on new responsibilities. Furthermore, the shortage of young professionals limits libraries' ability to respond to emerging research demands.

Another challenge is the insufficient organizational support. Libraries often lack adequate recognition within academic institutions, and the absence of funding impedes the implementation of effective RDM services. Without clear backing from university management, libraries struggle to secure the necessary infrastructure and develop long-term strategies.

Poor communication and collaboration between libraries and academic structures have fragmented RDM initiatives. The lack of coordination hinders the exchange of best practices and the development of unified policies. Additionally, researchers' limited understanding of the role of libraries contributes to the underutilization of RDM services.

Experts also highlighted that the security and confidentiality of research data remain critical concerns. Integrating RDM with existing infrastructures proves challenging, and the constant updates of standards require ongoing investments. The absence of adequate protection measures can discourage researchers from sharing data, ultimately affecting scientific collaboration.

For the effective implementation of RDM, it is essential to establish clear policies, provide adequate financial support, invest in staff training, and ensure better integration of libraries within the academic ecosystem. Strengthening collaboration between libraries, researchers, and higher education institutions is essential for the sustainable development of this field.

Chapter 4: ***Strengthening the role of academic libraries in the Republic of Moldova in implementing Research Data Management*** explores the strategies and actions through which academic libraries can enhance the implementation of Research Data Management (RDM). The

chapter examines how libraries can refine their services to better support researchers and develop the professional skills of librarians, ultimately strengthening their role in the academic ecosystem.

Subchapter 4.1: ***Adaptation and optimization of academic library activities in the context of Research Data Management implementation*** analyzes the strategies for adapting and optimizing academic library activities to effectively implement Research Data Management (RDM). The key stages identified include: assessing researchers' needs and library capacities, developing a regulatory framework, forming interdisciplinary teams, enhancing librarians' specialized skills, establishing the required technological infrastructure, designing RDM services, and fostering collaborations and strategic partnerships (Figure 2). A well-coordinated execution of these stages provides a solid foundation for the successful implementation of RDM in academic libraries in the Republic of Moldova.



Fig. 2. RDM implementation stages in academic libraries

Source: elaborated by the author.

To better understand the challenges and opportunities associated with adapting and optimizing the activities of academic libraries in the context of RDM implementation, a SWOT analysis was employed (Figure 3). This analysis helped assess the strengths and weaknesses of libraries, as well as the external opportunities and threats influencing this process.

Among the strengths are the positive changes in the culture of scientific research, librarians' experience in archiving and managing information, researcher support for open access publishing, and the existence of international collaboration initiatives. Additionally, the adoption of international standards and librarians' involvement in continuing education activities were highlighted.

The primary challenges identified include the absence of national policies and regulations on RDM, inadequate technological infrastructure, limited financial resources, and insufficient librarian skills. Furthermore, there is resistance to adopting new technologies and a lack of a cohesive strategy for data management.



Fig. 3. SWOT analysis on Research Data Management

Source: elaborated by the author.

Opportunities include the existence of international regulations supporting RDM, technological advancements, partnerships with external institutions, and access to global data management platforms. However, the rapid pace of technological change, the shortage of qualified personnel, and the lack of funding could hinder the implementation of RDM.

The recommended strategies include developing infrastructure, continuously training librarians, adopting clear policies, and fostering international collaboration. It is also very important for libraries to actively promote open data and develop efficient technological solutions for its management.

In **Subchapter 4.2**, ***Modeling academic library services regarding Research Data Management***, a research data management service model developed by the author is proposed. This model is designed to be applicable and beneficial to libraries in the Republic of Moldova as they implement it within their institutions. The proposed model aims to establish a flexible framework capable of adapting to the specific needs and unique context of academic libraries in Moldova, ensuring efficient Research Data Management (Figure 4).

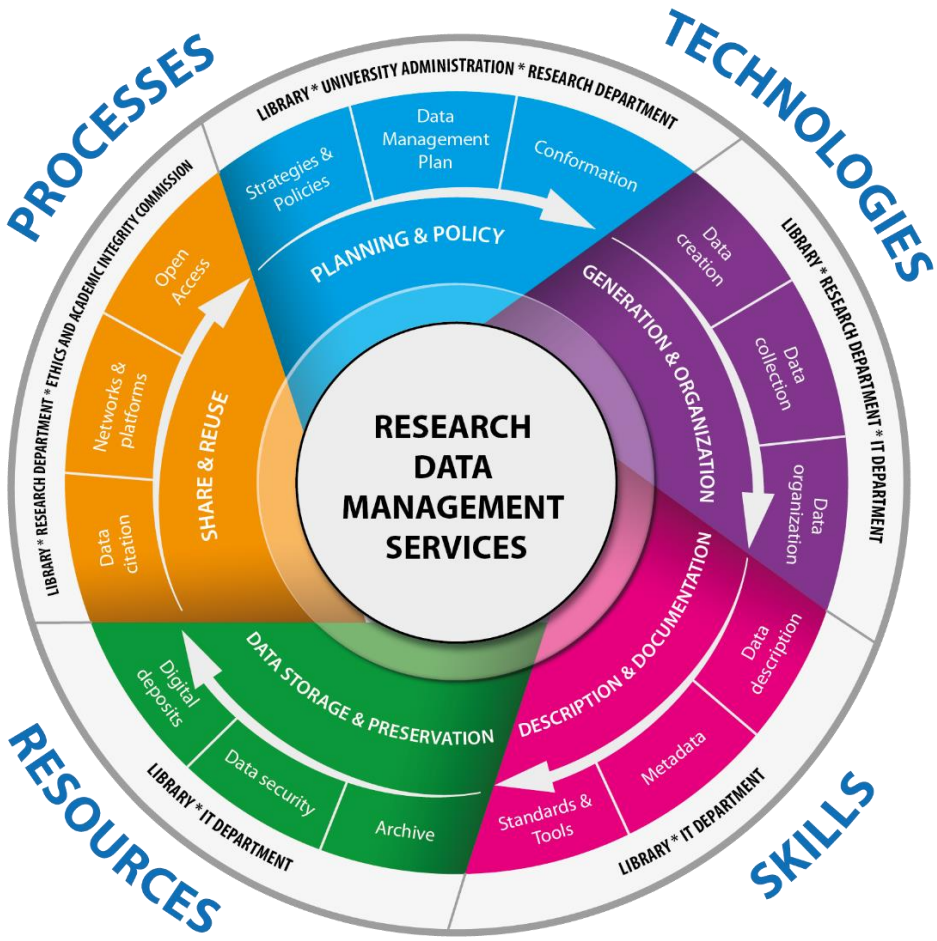


Fig. 4. Research Data Management support services model

Source: elaborated by the author.

The proposed RDM service model focuses on five core functional activities, which correspond to the stages of the data life cycle: developing data management policies and plans, generating and organizing data, documenting and describing data, storing and preserving data, and sharing and using data. Academic libraries can actively engage and provide RDM services to

support researchers at each stage of the data life cycle. These services include consulting on data organization and structure, offering recommendations on best practices for storage and preservation, assisting in the selection of data archiving and dissemination platforms, and ensuring compliance with ethical and legal standards. Furthermore, libraries support the development of RDM policies, the creation of data management plans, the adoption of metadata standards, and the utilization of digital educational tools and resources.

To function efficiently and ensure an integrated approach to Research Data Management, all components of the service model must be interconnected and operate synergistically. Close collaboration between the library and other support teams within the university is essential, such as research departments, IT departments, ethics committees, and others. The library should take on a central role in providing support and resources for researchers, serving as a coordinator and intermediary between the departments involved and the research community.

In **Subchapter 4.3**, ***Librarian competencies needed in Research Data Management***, the necessary competencies and skills for librarians to effectively support researchers in research data management are identified.

The evolving roles within academic libraries require librarians to assess their competencies and acquire additional skills to adapt to new responsibilities. With the implementation of research support services, it is essential to evaluate the current competencies of librarians and identify training opportunities in research data management. This assessment ensures that academic libraries are equipped to meet the growing demands for research support, particularly in the areas of effective data management and preservation. A potential set of skills and knowledge required by librarians has been extrapolated from data collected through surveys and interviews. Studies conducted with librarians at university libraries in the Republic of Moldova identified a comprehensive set of skills and abilities needed to effectively provide RDM services (Figure 5).

The most critical competencies identified are information skills (93.65%), essential for documenting and describing data, followed by knowledge of research methods (87.30%) and technical and ICT skills (84.13%), which encompass infrastructure management and data storage. Legal knowledge (68.25%) and pedagogical skills (68.25%) for user training are also significant. While knowledge of the research life cycle (63.49%) and disciplinary expertise (46.03%) are considered relevant, they hold comparatively less weight.

Librarians recognize the importance of continuous training and professional development in this evolving field. Approximately 53% of respondents rated the need to acquire competencies in research data management as very important, while 43% considered it important.

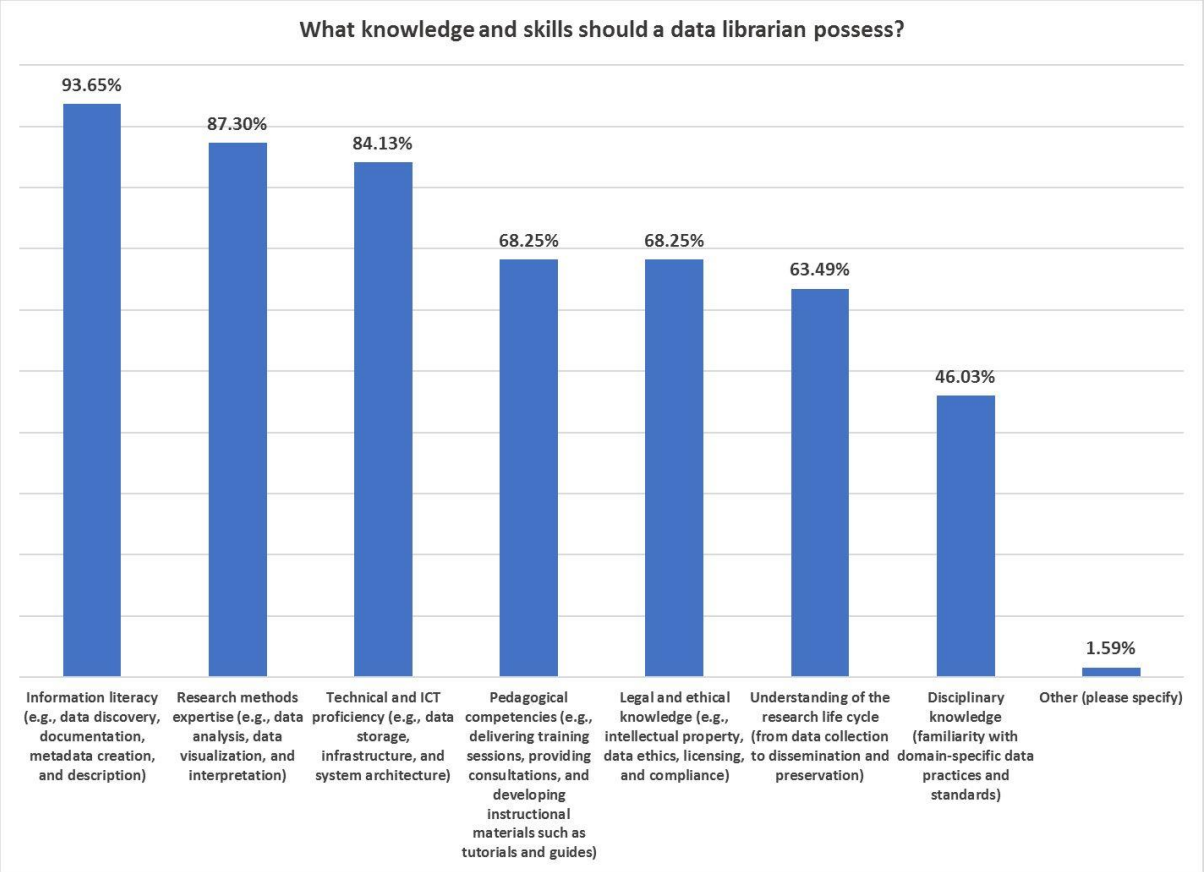


Fig. 5. Classification of competencies required for a data librarian

Source: elaborated by the author.

Respondents emphasized the need for librarian training to enhance the provision of effective research data management services. The highest-priority area identified was data archiving, storage, and preservation, followed by RDM policies and strategies (74.6%), data repository development (73%), and data classification (73%). Training in ethical and legal aspects, including licensing and copyright, was also considered essential.

Additionally, librarians must support researchers in data discovery and citation. The growing pressure from funding agencies necessitates training in developing data management plans (62%) and using related tools (60%).

The analysis revealed that university librarians in the Republic of Moldova are in the early stages of preparing for Research Data Management (RDM). Experts highlighted the need for continuous, specialized training, emphasizing that self-assessment of RDM skills can help librarians identify gaps and enhance their expertise.

Based on these findings, implementing training programs focused on ICT, digitization, archiving, and data repository management is strongly recommended. Institutional support and access to educational resources play a crucial role in bridging skill gaps. Among the key qualities for the effective delivery of RDM services are flexibility, adaptability, and a commitment to lifelong learning.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

In recent decades, the widespread use of information technologies has led to an exponential increase in the volume of digital research data, which has led to the need to develop policies,

infrastructures and services that support researchers in creating, storing, organizing and preserving data sets. Thus, scientific institutions are encouraged to implement data management practices that optimize research investments and accelerate scientific progress and innovation. Technological and regulatory developments in the field of research data management require academic libraries to continuously adapt and expand the skills and services offered to meet the changing needs of the academic community.

The main objective of this research was to analyze and investigate the role of academic libraries in managing research data. This topic is considered complex and still emerging in the applied research landscape of the Republic of Moldova.

The conclusions drawn from the results allow us to state the following:

1. Modern research is increasingly data-driven, making data an essential resource across various disciplines and interdisciplinary projects. The growing complexity and volume of data reflect rapid technological advancements and their integration into research. Recognizing data as a strategic asset in addressing global challenges has become increasingly important, opening new opportunities for progress across multiple fields.
2. Research data is a multifaceted concept that is difficult to define uniformly due to its diversity. It can exist in various forms - physical or digital - and differs depending on its source, the research questions addressed, and the scientific discipline. Recognizing this complexity and adopting a flexible, inclusive approach are essential for effective data management. Definitions provided by various organizations and researchers reflect this diversity, underscoring the need for adaptable and comprehensive policies. Research data management (RDM) is an evolving field at the core of the emerging paradigm of e-science and e-research. It is increasingly gaining attention from governments, funding agencies, academic and research institutions, as well as individual researchers. The concept encompasses a broad range of processes necessary for generating, organizing, documenting, ensuring access to, and facilitating the reuse of high-quality research data.
   RDM represents a complex, structured approach to handling data throughout the entire research life cycle—from collection and processing to dissemination and archiving. Its primary goal is to ensure data quality, integrity, and accessibility while adhering to ethical and legal standards (subchapter 1.1).
3. Analyzing the research data life cycle highlights the necessity of effective data management across all stages, from planning and collection to archiving and reuse. Each phase presents distinct challenges that require tailored solutions to ensure long-term data integrity and accessibility. A comprehensive approach to the data life cycle enables researchers to uphold high-quality standards and maximize the impact of research investments. Integrating best practices at every stage fosters a sustainable and efficient data management system that supports innovation and the continuous advancement of knowledge (subchapter 1.2).
4. In the Republic of Moldova, organizing and sharing research data within scientific institutions require a strategic and well-coordinated approach. Developing policies and practices that support efficient data management in alignment with international standards is essential. While data sharing between institutions can enhance collaboration and improve research quality, it also requires clear mechanisms for data protection and adherence to intellectual property rights. Effective data organization must be supported by robust

infrastructure and skilled human resources to ensure accessibility, reusability, and long-term preservation. Implementing these measures can strengthen the international standing of Moldovan scientific research and contribute to the country's economic and social development (subchapter 1.3).

5. The research conducted within the framework of this doctoral thesis confirmed the general hypothesis that implementing a Research Data Management system in academic libraries of the Republic of Moldova will enhance the quality, accessibility, and reusability of research data. The study identified a range of experiences, knowledge, and skills that librarians possess in library and information sciences, as well as in related fields, positioning academic libraries as the most suitable institutions for coordinating RDM. Key competencies include librarians' expertise in collecting, organizing, and facilitating access to information resources; developing and managing digital repositories; creating metadata; applying interoperability standards and protocols; actively promoting open science principles; assisting researchers throughout the research life cycle; and providing information literacy training and support services. Moreover, academic libraries serve as central hubs within university communities, offering secure and reliable environments for data storage and access. Their involvement in research data governance would ensure structured, well-supported, and secure data management, reinforcing their pivotal role in the university's academic ecosystem (subchapter 2.1).
6. The survey results indicate a positive attitude among librarians in the Republic of Moldova regarding the provision of Research Data Management (RDM) services. Specifically, approximately 78% of respondents expressed a willingness to engage in RDM activities, while only 22% preferred not to take on this role (subchapter 4.2).
7. Through its specialized services, the academic library can provide comprehensive support across all aspects of Research Data Management, including planning, collection, storage, processing, and dissemination. Furthermore, by fostering close collaboration with researchers and other relevant stakeholders, the library can actively promote best practices and standards in data management. This, in turn, contributes to the development of a culture of openness and collaboration within the academic community.
8. Based on the studies conducted, several challenges and obstacles to the implementation of RDM were identified. These include: the absence of national and institutional policies and regulations on open data and RDM; the lack of knowledge, skills, and expertise among librarians in research data management; the additional workload and resistance to change exhibited by some librarians; insufficient organizational support; poor communication, coordination, and collaboration among library staff, researchers, other university departments, and external institutions; and the traditional perception of library specialists within the academic community (subchapter 3.3).
9. Study on researchers' attitudes toward data sharing reveals that, while the vast majority of researchers acknowledge the benefits of making research data open, they nonetheless harbor concerns and reservations about sharing data publicly. The primary challenges they face include issues related to copyright and licensing, followed by fears that the data may be misused or contain sensitive and/or personal information. In the Republic of Moldova, the adoption of a culture of open data sharing faces significant barriers, primarily due to the absence of national policies that mandate or encourage researchers to make their

research results publicly available, especially when the research is funded by public sources (subchapter 3.2).

10. There are challenges and opportunities regarding the role of librarians in the RDM. One of the challenges is the need for librarians to continue training and professional development to keep up with emerging technologies and best practices. To provide specialized support according to the information and related needs of researchers, librarians should be equipped with a complex of skills and abilities: contextual knowledge of the institutional research environment, skills in collaboration and cooperation with the academic community, interpersonal skills and behavioral characteristics, technical and technological knowledge, as well as a specific set of skills and knowledge regarding research data management – knowledge of the principles and practices of research data management, skills in planning and implementing data management plans, expertise in the use of data management tools and technologies, knowledge of legislation and regulations on data protection, confidentiality and research ethics, etc. (subchapter 4.3).

Based on the findings, several recommendations have been proposed for the development of Research Data Management services in institutions across the Republic of Moldova:

At the level of national decision-makers (Government, Ministry of Education and Research, National Agency for Research and Development):

- Integration of Research Data Management actions and initiatives into national strategies and programs related to research and innovation, such as the National Program in Research and Innovation, the Digital Transformation Strategy of the Republic of Moldova, and the Education Code. Additionally, the development of a dedicated strategic plan is recommended, outlining clear goals, objectives, actions, and deadlines for the implementation of RDM initiatives.
- Ensuring adequate funding and allocating the necessary resources for the implementation and support of programs and initiatives in the field of research data management;
- Developing and approving a national policy on research data management, along with the development of guides, templates, and tools to assist institutions and researchers in implementing the policy. These could include data management plans, compliance assessment tools, data security and sharing guidelines, among others;
- Including the occupation of "data librarian" in the Classification of Occupations of the Republic of Moldova (CORM 006-2021);
- Integrating Research Data Management (RDM) into the Law on Libraries, the Regulation on the Organization and Operation of Libraries, and other relevant documents pertaining to library and information sciences.
- Allocating sufficient funds and resources from the government and institutions to support RDM infrastructure, including digital repositories, advanced storage solutions, backup systems, data security measures, support services, and training;
- Promoting a culture of data management by incorporating RDM into the research life cycle, including the integration of data management plans into grant proposals and project planning;

- Encouraging and supporting researchers to share their research data openly and transparently through policies and programs that offer recognition and rewards for data sharing;
- Collaborating and establishing partnerships with international organizations, institutions in neighboring and advanced countries, and regional initiatives to facilitate knowledge exchange, resource sharing, and harmonization of RDM practices;
- Establishing efficient mechanisms to monitor and evaluate the implementation of research data management policies and practices, ensuring their compliance and long-term efficiency.

At the level of universities and research institutions:

- Approving a *policy on open access to research data* to reinforce the institution's commitment to the principles of open access, transparency, and the visibility of both data and institutional practices in research;
- Developing clear and comprehensive research data management guidelines and practices at the institutional level, outlining procedures, responsibilities, and best practices for managing research data across disciplines, ensuring alignment with national and international standards and regulations, while addressing the specific needs and challenges of the university's research community;
- Establishing a support service or specialized teams within the institution to assist researchers in organizing and managing their data, including guidance on data collection, preservation, metadata, and data sharing requirements;
- Providing opportunities for the training and continuous development of support staff in all aspects of research data management, enhancing their skills, abilities, and competencies, followed by training researchers in the efficient management of research data;
- Integrating research data management topics into the master's level curriculum within the professional training field *0322 Library, Information, and Archival Studies*;
- Including research data management subjects within the Research Project Management discipline of the advanced higher education program at the 3rd cycle (doctoral level) for all specialties;
- Strengthening the capacity of well-trained and informed leaders and coordinators in the field of data management, enabling them to provide strategic direction, coordinate implementation efforts, and facilitate the exchange of information and best practices within the institution;
- Facilitating collaboration and partnerships between research institutions, universities, research funding agencies, the private sector, and non-governmental organizations to share resources, expertise, and best practices in research data management;
- Implementing data security and confidentiality measures to protect sensitive and confidential research data from unauthorized access, loss, or misuse, including establishing data encryption protocols, access controls, backup procedures, and data anonymization

techniques, while ensuring compliance with legal and ethical guidelines, such as discipline-specific regulations, for data protection.

For libraries:

- Establishing data librarian positions within academic libraries, clearly defining their responsibilities and competencies in the field of research data management;
- Designing and developing specialized research data management services in libraries to support researchers at every stage of the data lifecycle;
- developing and implementing clear policies and procedures on research data management in libraries, regulating aspects such as data acquisition, processing, storage, dissemination and archiving in accordance with international standards and practices in the field of RDM;
- Promoting and encouraging collaboration and the exchange of best practices between libraries to share expertise and experiences in the field of RDM by organizing regular meetings, seminars, or working groups to facilitate this knowledge exchange and stimulate innovation in research data management;
- Developing online educational resources, such as video tutorials, infographics, and interactive guides, accessible to both librarians and researchers, and integrating these resources into online learning platforms to provide practical, easily accessible information on RDM;
- Collaborating with the IT department to create and develop digital platforms and specialized tools that facilitate the discovery, access, and reuse of open research data, such as data catalogs, digital repositories, and data analysis and visualization tools;
- Facilitating and promoting open access to research data within academic communities by organizing roundtables, workshops, and training sessions, and by implementing actions aimed at increasing the impact and utilization of open access data.

For continuing education centers, providers of formal continuing education programs in librarianship:

- Integrating specific subjects and modules into the educational offerings of continuing education centers in the Republic of Moldova, covering the fundamental concepts of RDM, the research data lifecycle, and the standards and tools used for data management;
- Developing practical courses focused on training technical skills for data management and preservation, including aspects related to data repositories, metadata, data formats, open access requirements, and the use of specific software and platforms (e.g., ZOTERO, DMPonline);
- Offering certification programs in research data management to provide librarians with formal recognition of their expertise in this area.

For researchers:

- Supporting library initiatives that promote open access to research data;

- Actively collaborating with librarians to receive assistance in creating and implementing data management plans that comply with funder requirements and international standards, archiving data in digital repositories, and adhering to ethical and legal obligations;
- Participating in ongoing training sessions offered by libraries, focused on new technologies and tools for data management and sharing;
- Participating in regular meetings with librarians and other stakeholders for updates on new data management tools, legislative changes, as well as in feedback sessions on good practices in RDM.

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ADNOTARE

Autoare: Lupu Viorica

Tema: Rolul bibliotecii academice în managementul datelor de cercetare

Teză de doctor în științe ale comunicării la specialitatea 572.02 – Infodocumentare; Biblioteconomie și Știința Informării. Chișinău, 2025.

Structura tezei: introducere, patru capitole, concluzii generale și recomandări, referințe bibliografice din 281 de titluri, 18 anexe, 194 de pagini de text de bază, 28 de figuri și 5 tabele. Rezultatele cercetărilor sunt publicate în 20 lucrări științifice.

Cuvinte-cheie: biblioteci academice, ciclul de viață al datelor, date de cercetare, managementul datelor de cercetare, știință deschisă, servicii de bibliotecă.

Domeniul de studiu: științe ale comunicării.

Scopul lucrării: definirea rolului bibliotecii academice în gestionarea datelor de cercetare prin identificarea strategiilor, practicilor, tehnologiilor și competențelor necesare pentru a sprijini cercetătorii în managementul datelor de cercetare (MDC) și a oferi soluții pentru consolidarea capacităților bibliotecilor academice în contextul științei deschise.

Obiectivele: analiza abordărilor teoretico-conceptuale privind managementul datelor de cercetare; analiza rolului și importanței bibliotecilor academice în gestionarea datelor de cercetare; evaluarea practicilor, serviciilor și potențialului bibliotecilor în domeniul managementului datelor de cercetare; identificarea nevoilor și cerințelor bibliotecilor și ale comunității academice în ceea ce privește gestionarea datelor de cercetare; elaborarea modelului serviciilor de suport în managementul datelor de cercetare; identificarea competențelor necesare bibliotecarilor; cercetarea percepțiilor și atitudinii bibliotecarilor cu privire la furnizarea serviciilor de management al datelor de cercetare; examinarea opiniilor cercetătorilor din Republica Moldova cu privire la deschiderea și partajarea datelor de cercetare; propunerea unor recomandări și strategii pentru îmbunătățirea și optimizarea rolului bibliotecilor în domeniul managementului datelor de cercetare.

Noutatea și originalitatea științifică rezidă în aprofundarea cercetărilor teoretice și practice în domeniul managementului datelor de cercetare prin realizarea unei analize complexe a modului în care bibliotecile academice pot contribui semnificativ la acest proces în contextul erei digitale și al științei deschise.

Rezultatele noi pentru știință: lucrarea propune un model de servicii de suport pentru managementul datelor de cercetare, adaptat la nevoile specifice ale cercetătorilor și aliniat tendințelor actuale în gestionarea datelor de cercetare, precum și modele de politici și bune practici în managementul datelor de cercetare.

Semnificația teoretică a tezei rezidă în explorarea și conceptualizarea rolului multifuncțional al bibliotecarilor în tranziția către un management de date de cercetare eficient, dezvoltarea cadrului teoretic care descrie competențele de care au nevoie bibliotecarii pentru a deveni manageri de date calificați și avocați ai științei deschise, precum și în elaborarea unui model teoretic original de servicii de MDC, adaptat nevoilor instituțiilor academice din Republica Moldova, extinzând domeniul de cercetare prin noi concepte și abordări.

Valoarea aplicativă a cercetării constă în oferirea de soluții concrete pentru îmbunătățirea managementului datelor de cercetare în bibliotecile academice din Republica Moldova. Modelul practic de servicii de MDC propus poate optimiza procesele de colectare, stocare, organizare și partajare a datelor, contribuind la creșterea eficienței și calității cercetării științifice.

Implementarea rezultatelor științifice: Rezultatele cercetărilor științifice au fost expuse în cadrul conferințelor științifice naționale și internaționale și au fost valorificate prin publicarea a 20 de lucrări relevante pentru tema tezei.

АННОТАЦИЯ

Автор: Лупу Виорика

Тема: Роль академической библиотеки в управлении исследовательскими данными
Диссертация на соискание ученой степени доктора коммуникационных наук по специальности 572.02 – Инфодокументация; Библиотековедение и Информационные Науки. Кишинев, 2025.

Структура диссертации: введение, четыре главы, общие выводы и рекомендации, библиографический список из 281 источников, 18 приложений, 194 страниц основного текста, 28 рисунков и 5 таблиц. Результаты исследований опубликованы в 20 научных работах.

Ключевые слова: академические библиотеки, жизненный цикл данных, исследовательские данные, управление исследовательскими данными, открытая наука, библиотечные услуги.

Область исследования: коммуникационные науки.

Цель работы: определение роли академической библиотеки в управлении исследовательскими данными (УИД) путем выявления стратегий, практик, технологий и компетенций, необходимых для поддержки исследователей в управлении данными, а также разработки решений для укрепления потенциала академических библиотек в контексте открытой науки.

Задачи работы: анализ теоретико-концептуальных подходов к управлению исследовательскими данными; анализ роли и значимости академических библиотек в УИД; оценка практик, услуг и потенциала библиотек в области управления исследовательскими данными; выявление потребностей и требований библиотек и академического сообщества в управлении исследовательскими данными; разработка модели сервисов поддержки в УИД; определение необходимых компетенций библиотекарей; исследование восприятия и отношения библиотекарей к предоставлению услуг по управлению исследовательскими данными; изучение мнений исследователей Республики Молдова об открытости и обмене исследовательскими данными; разработка рекомендаций и стратегий для улучшения и оптимизации роли библиотек в управлении исследовательскими данными.

Научная новизна и оригинальность заключаются в углублении теоретических и практических исследований в области УИД посредством комплексного анализа вклада академических библиотек в этот процесс в условиях цифровой эпохи и открытой науки.

Новые научные результаты: в работе предлагается модель сервисов поддержки управления исследовательскими данными, адаптированная к специфическим потребностям исследователей и соответствующая современным тенденциям в управлении данными, а также модели политики и передовые практики в данной области.

Теоретическая значимость диссертации заключается в исследовании и концептуализации многофункциональной роли библиотекарей в переходе к эффективному УИД, развитии теоретической основы, описывающей компетенции, необходимые библиотекарям для становления квалифицированными менеджерами данных и защитниками открытой науки, а также в разработке оригинальной теоретической модели сервисов УИД, адаптированной к потребностям академических учреждений Республики Молдова, что расширяет область исследования новыми концепциями и подходами.

Прикладная ценность исследования состоит в предложении конкретных решений для улучшения УИД в академических библиотеках Республики Молдова. Предложенная практическая модель сервисов управления данными может оптимизировать процессы сбора, хранения, организации и обмена данными, способствуя повышению эффективности и качества научных исследований.

Внедрение научных результатов: результаты научных исследований были представлены на национальных и международных научных конференциях и опубликованы в 20 работе, имеющей отношение к теме диссертации.

ANNOTATION

Author: Lupu Viorica

Theme: The Role of the Academic Library in Research Data Management

PhD Thesis on Communication Sciences, Specialty 572.02 – Infodocumentation; Library and Information Sciences. Chisinau, 2025.

Thesis structure: Introduction, 4 (four) chapters, general conclusions and recommendations, bibliography with 281 references, 18 appendices, 194 pages of main text, 28 figures, and 5 tables. The research findings have been published in 20 scientific papers.

Keywords: academic libraries, data lifecycle, research data, research data management, open science, library services.

The field of research: Communication Sciences.

The purpose of this research is to analyze and define the role of academic libraries in RDM by identifying the strategies, practices, technologies, and competencies required to support researchers effectively, as well as to propose solutions for enhancing the capacity of academic libraries within the context of open science.

The objectives of research: Analyzing theoretical and conceptual approaches to Research Data Management (RDM); Examining the role and significance of academic libraries in RDM; Evaluating existing library practices and services related to RDM; Identifying the needs and requirements of both libraries and the academic community in RDM; Developing a model for library support services in RDM; Identifying the essential competencies required by librarians in RDM; Investigating librarians' perceptions and attitudes toward RDM services; Assessing researchers' opinions in the Republic of Moldova on open research data and data sharing; Proposing recommendations and strategies to enhance and optimize the role of academic libraries in RDM.

Scientific innovation and originality: The study deepens theoretical and practical research on research data management by conducting a comprehensive analysis of how academic libraries can significantly contribute to this process in the digital era and within the framework of open science.

New results for science: The study proposes a model of support services for research data management, tailored to the specific needs of researchers and aligned with current trends in research data management, as well as models of policies and best practices in the field.

The theoretical significance: The thesis explores and conceptualizes the multifunctional role of librarians in the transition to effective research data management. It develops a theoretical framework describing the competencies librarians need to become qualified data managers and advocates of open science. Additionally, it presents an original theoretical model of RDM services adapted to the needs of academic institutions in the Republic of Moldova, expanding the field of research through new concepts and approaches.

The applied value of the research: The research provides concrete solutions for improving research data management in academic libraries in the Republic of Moldova. The proposed practical model of RDM services can optimize processes related to data collection, storage, organization, and sharing, contributing to increased efficiency and quality in scientific research.

Implementation of scientific results: The results of the scientific research were presented at national and international scientific conferences and were disseminated through the publication of 20 papers relevant to the thesis topic.

LUPU Viorica

THE ROLE OF THE ACADEMIC LIBRARY IN RESEARCH DATA MANAGEMENT

Scientific specialty 572.02 – Infodocumentation; Library and Information Sciences

Summary of the doctoral thesis in communication sciences

Approved for printing: 11.04.2025
Edition: 25 copies
Paper format: 60x84 1/16
Printing sheets: 2.0
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