IJDC | *Research Paper*

Research Data Management Practices at the University of Namibia: Moving Towards Adoption

Astridah Njala Samupwa
University of Namibia

Michelle Kahn
University of Cape Town

Abstract

The management of research data in academic institutions is increasing across most disciplines. In Namibia, the requirement to manage research data, making it available for the purposes of sharing, preservation and to support research findings, has not yet been mandated. At the University of Namibia (UNAM) there is no institutional research data management (RDM) culture, yet RDM may nevertheless be practiced among its researchers. The extent to which these practices have been adopted is, however, not known. This study investigated the extent of RDM adoption by researchers at UNAM. It identifies current or potential challenges in managing research data, and proposes solutions to some of these challenges that could aid the university as it attempts to encourage the adoption of RDM practices. The investigation used Rogers' Diffusion of Innovations (DOI) theory, with a focus on the innovation-decision process, as a means to establish where UNAM researchers are in the process of adopting RDM practices. The population under study were the UNAM faculty members who conduct research as part of their academic duties. Questionnaires were used to gather quantitative data. The study found that some researchers practice RDM to some extent out of their own free will, but there are many challenges that hinder these practices. Overall, though, there is a lack of interest in RDM as the knowledge of the concept among researchers is relatively low. The study found that most researchers were at the knowledge stage of the innovation-decision process and recommended, among other things, that the university puts effort into creating RDM awareness and encouraging data sharing, and that it moves forward with infrastructure and policy development so that RDM can be fully adopted by the researchers of the institution.

Submitted 7 April 2021 ~ *Revision received* 5 January 2022 ~ *Accepted* 11 May 2022

Correspondence should be addressed to Astridah Njala Samupwa, P.O Box 1598/Ngweze/Namibia. Email: asamupwa@unam.na

The *International Journal of Digital Curation* is an international journal committed to scholarly excellence and dedicated to the advancement of digital curation across a wide range of sectors. The IJDC is published by the University of Edinburgh on behalf of the Digital Curation Centre. ISSN: 1746-8256. URL: http://www.ijdc.net/

Introduction

Changes in scholarly practice to include the management of research data during and after the research project have become common (Bryant, Lavoie & Malpas, 2017; Kell & Czernierwicz, 2016). The preservation and long-term curation of data sets has thus become part of scholarly communication, supporting the replication of published findings and facilitating the re-use of research data for new research inquiries (Bryant, Lavoie & Malpas, 2017). Data sets are preserved and curated through research data management activities.

Research data management (RDM) is "the organisation of data, from its entry to the research cycle through to the dissemination and archiving of valuable results" (Whyte & Tedds, 2011). Some of the factors believed to have influenced the emergence of RDM include: developments in information technology (IT), the interest in data-intensive science, policy changes among research funders, and a greater need to organise, manage, store and share research data among individuals and institutions (Cox et al., 2017 : p 2182).

Despite these factors, many African countries have not yet made RDM practices a national mandate. There is, however, an indication that RDM is being practiced to some extent in institutions on the continent (van Deventer & Pienaar, 2015), putting RDM in Africa, in general, at a development stage (Chiware & Becker, 2018). To what extent RDM has been adopted as a research practice by the population of one African university was a question that this study sought to answer.

Research Problem and Study Objectives

Namibia, a lower-middle-income country located in the south-western part of Africa, boasts three universities, of which the University of Namibia (UNAM) is one. Research is important to Namibia's socio-economic development and all universities engage in research activities. RDM is however not yet entrenched in the country's research culture. UNAM itself has no policy on data management, and, while this does not mean that researchers are not managing their data, little is known about the extent of RDM adoption among them. For the institution to remain viable within the global research environment, it needs to guide and assist researchers in the management of their research data. It cannot do this, however, if it is not aware of how well researchers understand the concept of RDM or what their current RDM practices are. The master's study from which this paper emanates sought to close this knowledge gap. The study did so by investigating the extent to which RDM has been adopted as part of the research process at UNAM; identifying challenges encountered by researchers attempting to practice RDM at UNAM; and providing possible solutions to some of the challenges identified.

Study Framework

Rogers' Diffusion of Innovations (DOI) theory has been used in studies that investigate the adoption of an innovation. While the theory is often used in relation to technology to explain how, why and at what rate the use of new technologies spread (Robinson, 2009), an 'innovation' can be any concept or object that is considered by a community to be new (Rogers, 2003). Rogers (2003) defined 'diffusion' as the process by which an innovation is communicated through certain channels over time among the members of a social system. DOI theory has been used in this study to investigate the diffusion of RDM (the innovation) at UNAM (the social system).

Innovations take a period of time from emergence to be broadly accepted and they tend to be adopted at different rates by members of a social system, being diffused quickly to 'innovators' and 'early adopters' and progressively more slowly to the 'early majority', 'late

majority' and, lastly, 'laggards' who are seen as risk-averse (Rogers, 2003). The population among which this study investigated the adoption of RDM was UNAM academic staff members, with the recognition that among the population will be those adopting RDM at different rates. There is also the recognition that the UNAM social system is different to that of other academic institutions.

The innovation-decision process makes up part of the DOI theory's 'time' dimension and is broken up into stages that encompass the process through which an entity goes from knowing about the existence of an innovation to continuing the use of it (Rogers, 2003, p. 168). To measure the adoption of a new idea, therefore, one can look to this process which shows that successful adoption is attained through the stages of 'information' (where an individual learns about the existence of an innovation and looks for information to learn more about it), 'persuasion' (where an individual forms an opinion about the innovation), 'decision' (the stage where the individual decides to adopt or reject the innovation), 'implementation' (the innovation is used by the individual) and 'confirmation' (where an individual decides whether the innovation is beneficial to them; they may decide not to adopt it in the end). These stages guided this study to find out where UNAM researchers are in the innovation-decision process with respect to the adoption of RDM practices, which allowed for appropriate recommendations to be made to mitigate some of the challenges of RDM identified.

Brief Literature Review

Studies done in Africa on RDM practices and adoption show low levels of service development (Chiware & Becker, 2018), a lack of guidelines on good RDM practice (Chigwada, Chiparausha & Kasiroori, 2017), lack of skills to provide useful RDM support services (Nhendodzashe & Pasipamire, 2017) and a "limited commitment" from decision-makers regarding policies and infrastructure (Van Deventer & Pienaar, 2015). However, studies have also found researchers engaging in data management activities on an individual level despite the lack of RDM culture at their institution (Kahn et al., 2014; Koopman & De Jager, 2016). The literature mentions several influences that may lead to the adoption of RDM. Among these are institutional and funder policies, the desire or need to conform to global trends, academic researchers seeking to collaborate, proof of research results, and growth of the Open Access Movement which encourages the sharing of research data (Buys & Shaw, 2015; Kahn et al., 2014; Koopman & De Jager, 2016).

There are, undoubtedly, challenges associated with implementing RDM, many related to infrastructure. Storage – such as the provision of institutional data repositories – seems to be a barrier found in many studies, including Buys & Shaw (2015), Kennan & Markauskaite (2015) and Koopman & De Jager (2016). Lack of knowledge – such as about data management plans (DMPs) – and data skills (data organisation or metadata, for example) have also been identified as obstacles to good RDM practice (van Tuyl & Michalek, 2015, Hickson et al., 2016, Bryant, Lavoie & Malpas, 2017). Knowledge about an innovation is believed to play a vital role in the success of an adoption of a new idea (Rogers, 2003).

Methodology

For this study, a quantitative approach was used with a survey design. Survey data were collected from researchers at UNAM using a questionnaire, this method being the most useful data gathering instrument in survey studies as the same questions can be asked to a large group. The questionnaire (which can be found as an appendix to Samupwa, 2019) consisted of 26 questions with a mixture of open-ended and closed questions. The questionnaire had two components: the first was designed to collect information on group demographics, and the second was designed to collect data to be used for description of the stage of adoption at which UNAM finds itself in terms of RDM, such as the extent of researchers' awareness and practices of RDM. The questionnaire was administered online via SurveyMonkey and ran for four weeks

after a letter of invitation was sent to potential participants. A total of 481 UNAM researchers were invited to participate in the survey. Ninety participants responded to the survey by clicking on the link in the invitation email. Of the ninety, a total of 75 responded to the benchmark question – which asked them to indicate if they conduct research or not – and were therefore deemed suitable as study participants.

Data Analysis and Interpretation

The data discussed in this section relate to the study objectives.

Demographic Details

For an understanding of respondents' characteristics, data were gathered about their occupation, highest qualification, faculty, and location (UNAM has 12 sites across Namibia). The analysis can be seen in Table 1. Most respondents were lecturers (45%), senior lecturers (15%) or librarians (13%), employed on a permanent or full-time basis, and had been at UNAM for up to a decade. Most (53%) held a master's degree, with 26% with PhDs and 19% with bachelor's degrees. Respondents were spread across all faculties, but 25% were from Humanities and Social Sciences, 17% from Agriculture and Natural Resources, 17% from Education, and 15% from Science. Most responses were from UNAM's main campus in Windhoek: slightly above half (56%) – not surprising, as substantially more academic researchers are based at the main campus compared to other campuses. All campuses, except one (Southern campus), were, however, represented.

Table 1: Selected demographic information

	Responses	Percentage
Occupation (n=75)		
Lecturer	32	45%
Senior lecturer	11	15%
Librarian	9	13%
Highest qualification (n=73)		
Bachelor's degree	14	19%
Master's degree	39	53%
PhD	19	26%
Faculty (n=69)		
Agriculture and Natural Resources	12	17%
Education	12	17%
Health Sciences	13	19%
Humanities and Social Sciences	17	25%
Science	10	15%

Table 1 (cont.)

	Responses	Percentage
Campus (n=71)		
Windhoek (main campus)	40	56%
Katima Mulilo	6	9%
Neudamm	5	7%
Ogongo	5	7%
Rundu	5	7%

RDM Practices, Awareness and Influences

To establish the current RDM practices of researchers at UNAM, survey respondents were provided with a list of data activities and were asked to indicate with which of them they were involved. As can be seen in Table 2, in general, respondents seemed to be involved in almost all RDM practices listed in the questionnaire, with data collection, predictably, being selected by most academics (89%). 'Selecting data for use' was selected by slightly more than half (51%) and the rest of the data management practices were selected by fewer than half. Writing a data management plan – a growing funder requirement – received the lowest selection (12%).

Table 2: Data-related practices (n=65)

RDM activities	Responses	Percentages
Collecting research data	58	89%
Selecting data for use	33	51%
Saving data into retrievable formats	28	44%
Sharing research data	28	44%
Selecting data for storage	24	37%
Keep data securely	23	35%
Protecting data with passwords	19	29%
Describing selected data/ naming data files	18	28%
Ensure data privacy and anonymity	18	28%
Creating safe and secure data storage	16	25%
Preservation of research data for long term use	14	22%
Data re-use	9	14%
Writing of DMPs	8	12%
Other	2	4%

The question about data activities was asked of all respondents as the study was trying to ascertain if they were practicing RDM, and whether or not they knew about the concept. A number of questions that followed, however, aimed to delve into specific RDM issues and therefore required respondents to know about the concept of RDM. To begin with, to establish awareness about RDM, a simple question was asked: Have you heard about research data management (RDM)? RDM is a relatively new concept and as such, it has not been formally

implemented in many African academic institutions (Chiware & Becker, 2018). It was not therefore surprising that 69% of respondents indicated that they had not heard of RDM.

The survey then questioned the remaining 31% who knew about RDM regarding:

- how they first learnt about RDM;
- whether they were aware of any RDM support services (such as the provision of a data repository or other secure storage for data, training on metadata creation or data management planning, or RDM policies) in place or in development at UNAM;
- whether they had independently tried to find out more about RDM;
- how often, if ever, they discussed RDM in their department or outside their department; and
- whether, as an individual, they invested time and effort in integrating RDM into their research processes.

The above questions were informed by the DOI innovation-decision process, which involves the development of an individual, organisation or other decision-making unit, from knowing about the existence of an innovation, through to continuing the use of it (Rogers, 2003). The main results from these questions are shown in Table 3.

Table 3: Activities related to innovation-decision process (n=22)

Question	Response
How did you first learn about RDM?	The internet (31%) Conferences (22%) Friends or colleagues (14%), workshops (14%), and social media (14%)
Are you aware of any RDM services already in place at UNAM?	No (77%) Not sure (14%) Yes (9%)
Are you aware of any RDM services in development at UNAM?	No (77%) Yes (13%) Not sure (10%)
As an individual have you tried to find out more about RDM?	No (55%) Yes (45%)
How often if ever, do you discuss RDM in your own department?	Sometimes (50%) Never (45%)
How often if ever, do you discuss RDM outside your own department?	Never (54%) Sometimes (36%)
As an individual, do you invest time and effort in integrating RDM in your research process?	No time at all (37%) A little time (31%) A moderate amount of time (23%)

All 65 participants were then asked questions about their potential adoption of RDM and were positive in their responses, with 86% affirming that, in the interests of preserving their research data for future scrutiny and re-use, they would consider changing their data practices to include more of the previously listed RDM activities (Table 2).

To a question about what would influence respondents' adoption of RDM practices, the majority of respondents indicated that policies, such as those from funders or their institution, would have the greatest effect (58%). There was also an indication (31%) that their discipline would influence them positively in this regard.

RDM Support Services

When asked about RDM support services that they would like if UNAM began to encourage RDM among its researchers, many respondents wanted training on RDM activities (81%), safe and secure data storage (75%) and intensive workshops on RDM (68%), as can be seen in Table 4. Slightly below half (49%) indicated that UNAM should participate in global open data initiatives and policy developments respectively as well as provide a data repository (48%) and training on metadata creation (48%).

Table 4: Desired services by academic researchers (n=65)

Services	Responses	Percentage
Provide safe and secure data storage	49	75%
Provide training	53	81%
Provide data repository	31	48%
Provide workshops on RDM	44	68%
Provide training on metadata creation	31	48%
Participate in global open data initiatives	32	49%
Develop policies to enhance RDM	32	49%
Other	2	4%

RDM Challenges Faced by UNAM Academic Researchers

One of the objectives of the study was to identify the challenges faced by researchers as they work with research data. A survey question therefore asked respondents to indicate, from a list provided, which research data challenges they faced. Safe and secure data storage was shown to be the biggest challenge, although all options were selected. Results are shown in Table 5.

Table 5: Challenges faced by academic researchers at UNAM (n=65)

Challenges	Responses	Percentage
Loss of data	34	52%
Lack of safe and secure data storage	45	69%
Technological Obsolescence	17	26%
Lack of RDM skills and experience	34	52%
Lack of guidelines on managing research data	37	57%
Lack of proper data infrastructure	31	31%
Lack of knowledge in metadata creation	20	31%
No standard guideline on file naming of data	26	40%
Other	2	4%

Discussion

The findings of the study are discussed in relation to the research objectives and the innovation-decision process of the DOI theory, which frames the study, which in turn allowed the researchers to draw a conclusion about where in the process UNAM is and then provide appropriate solutions to challenges.

Adoption

Before the innovation-decision process begins, an innovation must be known. The study found that there is a low level of awareness of the concept of RDM among those who responded to the survey at UNAM. Despite low awareness, RDM practices are actively taking place at UNAM within the group that responded to the survey, despite many of them not knowing what RDM is. The practice of managing research data by individual researchers is therefore not firmly linked to their awareness of the concept of RDM. This study found that the adoption of RDM practices at UNAM is in its infancy as adoption is only at an individual level.

More than half of those who were aware of the concept of RDM showed an intention to learn more about it, which would enable them to form an opinion about it, but most showed little or no time spent on integrating RDM practices into their research. The study concluded that the majority of this group of researchers is at the stage of adoption where they are still finding out about the innovation: the knowledge stage of the innovation-decision process. Some, however, are at the decision stage, as they are aware of the concept of RDM and are engaged in finding out more about it, activities that would lead to them making a choice about adopting or rejecting the innovation. It is interesting to note that it is the librarians who are the individuals at this second stage. Minishi-Majanja and Kiplang'at (2005) suggested that support staff, among them librarians, often fall into the 'innovators' category of adopters and therefore can play an important part in the diffusion of an innovation.

Challenges

Researchers at UNAM who do manage their research data are faced with many challenges as they attempt to work with research data. Safe and secure storage of research data was noted as a great challenge; others were loss of data, technological obsolescence, lack of RDM skills and experience, lack of guidelines on managing research data, lack of proper infrastructure, lack of knowledge about metadata creation and no standard guidelines on file naming. The lack of institutional engagement in developing RDM support services is also a big challenge. Knowing where in the innovation-decision process researchers are can help the institution respond to these challenges appropriately.

Solutions

Considering researchers' RDM challenges, suggestions for moving the majority of the population beyond the knowledge stage of the innovation-decision process and towards complete adoption are as follows:

- Awareness creation. Using the internet as well as direct communication with researchers about data management are effective ways of influencing individuals to adopt a new idea. Librarians, in particular, can create awareness about RDM as they have the knowledge of and the contact with researchers, which would allow for effective communication.

- UNAM must develop policies for RDM. The literature shows that institutional and funder policies are big drivers for the adoption of RDM practices. At UNAM, some researchers would be learning about RDM for the first time when they are confronted with a policy. Awareness of the existence of something is the all-important first step towards the first stage of adoption.

- Infrastructure development. If proper management of research data is to be attained at UNAM, the institution needs to develop infrastructures for RDM support services. Without infrastructure in place that would help them to manage their data, researchers would be likely to reject RDM adoption.

- Safe and secure storage. In particular, infrastructure must cater for the need for safe and secure storage of data sets. Secure storage space could be provided on the university's network or through a general-purpose repository such as Zenodo.

- RDM education. UNAM should consider developing formal and/or informal courses around RDM to help current and future researchers learn how to manage their research data. Training would ensure researchers are fully informed about the concept of RDM as well as about best practices.

- Data management plans. UNAM should encourage the writing of DMPs for all research carried out by its researchers, whether a funder requires them or not, thus, in essence, forcing researchers into the implementation stage, though not yet the final, confirmation stage of the innovation-decision process.

- Data sharing. UNAM should encourage researchers to link their research findings to the supporting datasets, emphasising the benefit that they would reap from this action, for example, through increased citations. Once they encounter this benefit, they may well be at the confirmation stage of the innovation-decision process.

While the passage of time will likely result in more adopters of RDM, Minishi-Majanja & Kiplang'at (2005) argued that, in developing countries, it is socio-economic issues (financial and human resources, politics and culture) rather than an aversion to the innovation itself that influence the diffusion of an innovation. For some of the above solutions to be implemented, particularly infrastructure development, funding will need to be sought. With Namibia's push to become a knowledge economy, it is hoped that at least some funds would be available from the government.

Conclusion

The researchers recognise that there were several limitations to the study which included that the study was limited to UNAM, therefore the generalisation of findings to other academic institutions in Namibia cannot be made. In addition, because of the response rate of 16% (attributed to lecturers being away from their desks at the time of the year the study was conducted, and some staff being on an industrial strike at the time), the findings cannot be generalised to the institution, although the researchers believe that more people would have been motivated to take part in the study if they had been familiar with the topic under study. Despite the limitations, the study still has strengths, and it is a contribution to the field of RDM.

RDM is becoming common practice worldwide; a positive intervention by UNAM might produce rapid adoption and full implementation of RDM practices among its researchers, benefitting the institution by ensuring it conforms to global standards, thus improving the quality and quantity of its research.

Acknowledgements

We acknowledge the Mastercard Foundation Scholars Program for financial support to undertake this study. Thank you for your generous funding.

References

Bryant, R., Lavoie, B. & Malpas, C. (2017). *A tour of the research data management (RDM) service space. The realities of research data management, Part 1*. Dublin, Ohio: OCLC Research. doi:10.25333/C3PG8J.

Buys, C. & Shaw P. (2015). Data management practices across an institution: a survey and report. *Journal of librarianship and scholarly communication*, 3(2), 0-24. doi:10.7710/2162-3309.1225.

Chigwada, J., Chiparausha, B. & Kasiroori, J. (2017). Research data management (RDM) in research institutions in Zimbabwe. *Data science journal*. 16, 1-9. doi:10.5334/dsj-2017-031

Chiware, E.R.T. & Becker, D.A. (2018). Research data management services in Southern Africa: a readiness survey of academic research libraries.*African journal of library, archives and information science*. 28(1). doi:10.7553/81-2-1563.

Cox, A.M., Kennan, A.M., Lyon, L. & Pinfield, S. (2017). Developments in research data management in academic libraries: towards an understanding of research data services maturity. *Journal of association for information science and technology*. 68(9), 2183-2199. doi:10.1002/asi.23781.

Hickson, S., Poulton, K.A., Connor, M., Richardson, J. & Wolski, M. (2016). Modifying researcher's data management practices: a behavioral framework for library practitioners. *IFLA journal*. 42(4), 253-265. doi:10.1177/0340035216673856.

Kahn, M., Higgs, R., Davidson, J. & Jones S. (2014). Research data management in South Africa: how we shape up. *Australian academic and research libraries*, 45(4), 296-308. doi:10.1080/00048623.2014.951910.

Kell, C., & Czerniewicz, L. (2016). Visibility of scholarly research and changing research communication practices: a case study from Namibia. In Esposito, A. 2016. *Research 2.0 and impact of digital technologies on scholarly inquiry*. Hershey, Pennsylvania: IGI global. Retrieved from http://hdl.handle.net/11427/23990

Kennan, M. & Markauskaite, L. (2015). Research data management practices: a snapshot in time. *International journal of digital curation*, 10(2), 69-96. doi:10.2218/ijdc. v10i2.329

Koopman, M. & De Jager, K. (2016). Archiving South African research data: how ready are we? *South African journal of science*, 112(7), 1-7. doi:10.17159/sajs.2016/20150316

Minishi-Majanja, M.K. & Kiplang'at, J. (2005). The diffusion of innovations theory as a theoretical framework in Library and Information Science research. *South African Journal of Libraries and Information Science*, 71(3), 211-224. doi:10.7553/71-3-586.

Nhendodzashe, N. & Pasipamire, N. (2017). *Research data management services: are academic libraries in Zimbabwe ready? The case of University of Zimbabwe library*. Paper presented at IFLA WLIC 2017, Wroclaw, Poland. Retrieved from http://library.ifla.org/1728/.

Robinson, L. (2009). *A summary of Diffusion of Innovations*. Retrieved from https://www.enablingchange.com.au/Summary_Diffusion_Theory.pdf. [2018, April 15].

Rogers, E. (2003). *Diffusion of Innovations* (5th ed.). New York: Free press.

Samupwa, A.N. (2019). *Adopting research data management (RDM) practices at the University of Namibia (UNAM): a view from researchers* . Master's thesis, University of Cape Town. Retrieved from http://hdl.handle.net/11427/31205.

Van Deventer, M. & Pienaar, H. (2015). Research data management in a developing country: a personal journey. *International journal of digital curation*. 10(2), 33-47. doi:10.2218/ijdc.v10i2.380.

Tuyl, S. & Michalek, G. (2015). Assessing research data management practices of faculty at Carenergie Mellon University. *Journal of librarianship and scholarly communication*. 3(3), 1258. doi:10.7710/2162-3309.1258.

Whyte, A. & Tedds, J. (2011). *Making the case for research data management*. Edinburgh: Digital Curation Centre. Retrieved from https://www.dcc.ac.uk/guidance/briefing-papers/making-case-rdm.