THE MEDIATING ROLE OF LIBRARIANS' COMPETENCIES IN THE APPLICATION OF METADATA PRACTICES FOR THE MANAGEMENT OF DIGITAL INFORMATION RESOURCES IN UNIVERSITY LIBRARIES IN NIGERIA

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Abstract

Metadata practice has evolved over the years with the developments in ICTs, as such it is very important to ascertain metadata librarians' competencies with ICT and metadata tools for the management of digital information resources. This study adopted survey research design. The secondary population comprised all federal universities in Nigeria that are having and managing digital information resources. The primary population comprised the 275 staffs from 20 federal universities that are involved in the application of metadata for the management of digital information resources. Due to the manageable size of the respondents, total enumeration was used. A structured questionnaire was used for data collection after being validated and its reliability tested. The research questions were analyzed with descriptive analysis while the hypothesis were tested with inferential statistics. The findings of this study shows that the respondents have the necessary competencies (skills) to support the management of digital information resources through the application of metadata practice. Furthermore, the analysis revealed that the respondents have more basic ICT skills than core metadata skills for the management of digital information resources. The study concluded that librarians' competencies have a significant influence on the management of digital information resources in Federal University libraries in Nigeria. Therefore, it is recommended that the various university management understudied put metadata ICT skills of librarians and facilitating conditions into consideration when designing and implementing metadata projects for the management of digital information resources.

Keywords: Digital information resources; librarians' competencies; metadata practices; universities.

INTRODUCTION

The trend worldwide has proved that management of information resources had shifted from the traditional method to digital methods and most libraries especially in the developed countries have upgraded to using metadata practices at varying levels in their information resources management, description and access services. This new practice extend beyond mere description for DIRs to providing administrative, preservation, technical and structural information which help to ensure adequate description and interoperability between systems; while also enhancing the organization, preservation, discovery and access to resources. However, Adeleke (2016) reported that in Nigeria, metadata application have not reached its full capacity due to lack of skill and formal professional training. Similarly, Bamise, Oluwaniyi, and Igbeneghu (2019) revealed lack of proper or formal training opportunities which is supposed to facilitate continuous professional development and improvement in librarians' skills. Anyim (2018) reiterated this further, as a major challenge to accessing and retrieval of digital information resources and from his study, it has not been empirically investigated the areas in which improvements are needed to enhance the

management of DIRs; this is the gap the current research intends to fill, looking at the mediating effects of librarians' competencies which is necessary towards the application of metadata practices.

RESEARCH OBJECTIVE

The main objective of the study is to examine the mediating roles of librarians' competencies in the application of metadata practices for the management of digital information resources in Federal University libraries in Nigeria. The specific objective is:

1. To find out the level of competencies possessed by librarians in the application of metadata practices for managing digital information resources in University libraries in Nigeria.

HYPOTHESIS

$H_{01:}$ Librarians' competencies will not mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria.

METHODOLOGY

Survey research design was adopted for the study. The secondary population comprised all federal universities in Nigeria that meets the following criteria: having digital information resources (born and/ converted digital) and have digital or institutional repository. From the preliminary study, only 20 federal universities met the criteria for inclusion for the study. The primary population which is also the target respondents' are university staffs that are involved in the application of metadata for the management of digital information resources. Based on the preliminary study, the primary population comprised a total of 275 staffs from 20 federal universities. Due to the manageable size of the respondents, total enumeration was used as the sample size. A structured questionnaire was used for the data collection. The instrument was partly adapted and modified from related studies and partly self-developed by the researcher. Content validity and face validity were quantitatively used to validate the questionnaire through the supervisor, research methodologist, statistician and metadata librarians. The research instruments indicated a good content and construct validity. The Cronbach's alpha reliability values ranged from 0.750 - 0.887, indicating good instrument reliability. Two hundred and seventy five (275) copies of questionnaire were distributed to the respondents, but only 229 copies were returned and appropriately filled and validated for analysis, indicating an 83.3% response rate. The research questions were analyzed with descriptive statistics (tables, frequency counts, percentage, mean, and standard deviation), while the hypotheses were tested with inferential statistics at 5% level of significance. Statistical Package for The Social Science (SPSS 23.0 version) was used for data analysis.

DATA ANALYSIS

Using the Baron and Kenny principle of mediation analysis, the hypotheses were tested for better regression output. To avoid false results, the model of best fit was used to examine the predictive relationships in each step of the Baron and Kenny model based on expert literature (Tabachnick & Fidell, 2013). The researcher predicts that for digital information resources to be well managed there must be some facilitating conditions:

availability of ICT facilities, institutional and individual support factors and librarians' competencies. This section therefore will examine the mediating effect that librarians' competencies on the application of metadata practices; as a factor has on the management of the DIRs of federal university libraries. Mediation refers to a process by which the independent variable exerts its effect on the dependent variable by an influencing variable known as a mediating variable. Using an illustration, mediation can be depicted in the following way:
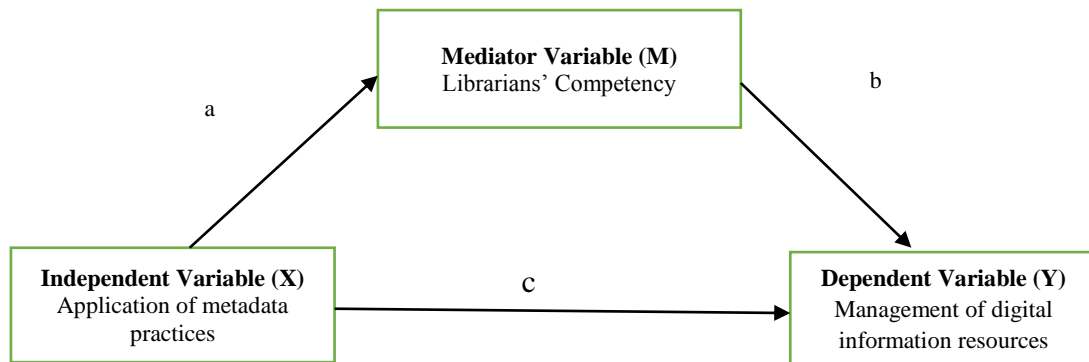

FIG 1: Mediation Analysis

Baron and Kenny (1986) four-step regression method was used for the mediation analysis. The purpose of steps 1 – 3 was to establish that zero-order relationships among the variables exist. If one or more of these relationships are non-significant, researchers usually conclude that mediation is not possible or likely. A significant relationship from steps 1 – 3, led to step 4, which was necessary to ascertain if mediation occurred. The conditions are given as follows:

Step 1: There must be a relationship between X (independent variable) and Y (dependent variable). In other words X (IV) must predict Y (DV)
Step 2: X (IV) predicting M (MV)
Step 3: M (MV) predicting Y (DV)
Step 4: X (IV) and M (MV) predicting Y (DV)

FINDINGS

Table 1: ICT Skills Possessed by Librarians

Basic metadata/ ICT skills To what level can you…	Very High	High	Moderate	Low	Very Low	Mean	SD
perform basic computing operations such as word processing, data entry and capture	108(47.2%)	80(34.9%)	34(14.8%)	07(3.1%)		4.26	.82
scan and upload on computer	91(39.7%)	82(35.8%)	46(20.1%)	09(3.9%)	01(0.4%)	4.10	.88
assign terms and classification number e. g Library of Congress Classification Scheme, Sears List of subject Headings	69(30.1%)	100(43.7%)	39(17.0%)	14(6.1%)	07(3.1%)	3.92	.99
use instructions from a metadata content standard	52(22.7%)	110(48.0%)	57(24.9%)	07(3.1%)	01(1.3%)	3.88	.83

3

(AACR2, RDA guidelines) to formulate authorized entries and manage identifiers for entities							
Weighted Mean							**4.04**
Core metadata skills To what level can you…							
utilize metadata structure standard (MARC, Dublin Core, MODS, etc.)	36(15.7%)	116(50.7%)	53(23.1%)	17(7.4%)	07(3.1%)	3.69	.93
apply metadata content standards such as AACR2, RDA, DACS, etc.	50(21.8%)	88(38.4%)	57(24.9%)	25(10.9%)	09(3.9%)	3.63	1.06
use tools such as OCLC, MarcEdit, XML Notepad for metadata creation, editing, analysis, and transformation	31(13.5%)	94(41.0%)	68(29.7%)	19(8.3%)	17(7.4%)	3.45	1.06
integrate, map, and transform a metadata record/document from one metadata standard to another like converting from MARC-to-XML	20(8.7%)	91(39.7%)	76(33.2%)	26(11.4%)	16(7.0%)	3.32	1.02
Weighted Mean							**3.52**
Average Weighted Mean							**3.78**

Source: Field Survey Results, 2022

If mean is ≤ 1.49 = Very Low; 1.5 to 2.49 = Low; 2.5 to 3.49 = Moderate; 3.5 to 4.49 = High; 4.5 to 5.0 = Very High

Criteria mean = 3.0

From Table 1, librarians' skills were measured with basic ICT skills and core metadata skills. It was revealed that there is a high level of skill possessed by librarians in Federal University libraries in the application of metadata practices for managing digital information resources. This is due to the value of the overall weighted mean (3.78, on a scale of 5) which falls within 'High Level' in the decision criteria. The finding revealed that librarians possessed very high level of basic computing operations ($\bar{x}$= 4. 62), assigning terms and classification number ($\bar{x}$= 3.92) utilize instructions from a metadata content standard ($\bar{x}$= 3.88), utilization on metadata structure standard ($\bar{x}$= 3.69) and application of metadata content standards ($\bar{x}$=3.63), while the use of tools such as OCLC, MarcEdit, XML Notepad ($\bar{x}$=3.45) and integrating, mapping and transforming a metadata record/document from one metadata standard to another ($\bar{x}$=3.32) indicated moderate levels. This implies that the librarians in Federal University libraries possess high level of ICT skills and core metadata skills in the application of metadata practices for managing digital information resources.

Table 2: Trainings of Librarians

Trainings	Responses	
	N	**Percent**
Professional development courses	121	16.8%
Workshops	172	23.8%
Employer-sponsored training	106	14.7%
On the job training	168	23.3%
Online learning (You tube, Internet, Webinar)	145	20.1%
No additional training	10	1.4%

	722	100.0%

Source: Field Survey Results, 2022

The result of Table 2 shows that in overall, librarians in federal university in Nigeria have been exposed to various trainings on metadata. Relatively, the result shows that workshops (23.8%), on-the-job training (23.3%), online learning (20.1%) and professional development courses (16.8%) had high percentage scores. However, items such as employer-sponsored training (14.7%) recorded a low score. This suggests less attention have been given to employer-sponsored training on metadata in federal university libraries in Nigeria.

Ho$_1$: Findings regarding to the mediating effects of librarians' competencies on the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria is presented in line with the Kenny and Baron Mediation Analysis Process.

1. Application of metadata practices has no significant influence on management of digital information resources in Federal University libraries in Nigeria (Step 1).
2. Application of metadata practices has no significant influence on librarians' competencies in Federal University libraries in Nigeria (Step 2).
3. Librarians' competencies have no significant influence on the management of digital information resources in Federal University libraries in Nigeria (Step 3).
4. Librarians' competencies will not mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria (Step 4).

1. Direct Effects of Application of Metadata Practices on Management of DIRs

Table 3. Direct Effects of Application of Metadata Practices on Management of DIRs

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	24.381	.570		42.745	.000		
Types of metadata practices	.109	.133	.059	.823	.411	.805	1.242
Tools for Metadata Practices	.292	.083	.249	3.495	.001	.805	1.242

a. Dependent Variable: Management. $F (2, 226) = 9.590$, $p = 0.000$ $R^2 = .078$ $Adj. R^2 = .070$.

In step 1, a regression analysis was carried out with application of metadata practices predicting management of digital information resources using multiple linear regression analysis. The result indicates that out of the two parameters of application of metadata practices, it was tools of metadata (*Beta* = .249, *t* (223) = 3.495, *p* = 0.001) that had a positive significant influence on management of digital information resources. Thus, applying the tools of metadata increases the chances of management of digital information resources in Federal University libraries in Nigeria. However, types of metadata practices (*Beta* = 0.059, *t* (223) = 0.83, *p* = 0.411), had a positive insignificant influence on management of digital information resources. This signifies that application of appropriate metadata tools could be used to predict management of digital information resources in Federal University libraries in Nigeria.

The model's coefficient of determination value, Adj. R^2 was found to be 0.070 indicating that 7.0% of management of digital information resources was explained by application of metadata (dimensions) in Federal University libraries in Nigeria. However, the

model did not explain 93.0% of the variation in management of digital information resources, implying that there are other factors associated with management of digital information resources which were not captured in the model. Additionally, the F (2, 226) = 9.590, p = 0.000 revealed that application of metadata (dimensions) was considered statistically significant in predicting management of digital information resources in Federal University libraries in Nigeria. The results from Table 3 show that the predictor equation takes the form:

Management of DIR = 24.381 + .292 Tools for Metadata Practice

The regression coefficient of Tools for Metadata is .292. This implies that a unit increase in tools of Metadata will lead to a .292 unit increase in management of DIR in Federal University. Therefore, since the coefficient of Tools for Metadata Practice is statistically significant, the sub-hypothesis representing the step one of the mediation model was hereby rejected. Hence, there is a direct effect of application of metadata practices on management of DIR in Federal University libraries in Nigeria. Path coefficient of the direct effect of application of tools for metadata practices on management of DIR is 0.249 with p-value = 0. 001.

2. Direct Effects of Application of Metadata Practices on Librarians' Competencies

Table 4. Direct Effects of Application of Metadata Practices on Librarians' competencies

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	32.838	1.560		21.050	.000		
Types of metadata practices	-.071	.363	-.014	-.195	.845	.805	1.242
Tools for Metadata Practices	.157	.228	.051	.686	.493	.805	1.242

Dependent Variable: COMPETENCE. F (2, 226) = .243, p = 0.785. R^2 =.002 Adj. R^2 =-.007.

The analysis of step 2 is presented in Table 4. The model's coefficient of determination value, Adj. R^2 was found to be -.007 indicating that the effect of application of metadata on librarians' competencies is very inconsequential and negligible. The result also indicates that the two parameters that measures metadata practices namely types of metadata (Beta = -.014, t (223) = -.195, p = 0.845) and tools for metadata (Beta = .051, t (223) = .686, p = .493) had an insignificant influences on librarians' competencies. Hence, applying the tools and types of metadata has no connection with Librarians' competencies in Federal University libraries in Nigeria. This signifies that application of tools and types of metadata practice cannot be used to predict Librarians' competencies in Federal University libraries in Nigeria. Therefore, the sub-hypothesis representing the step 2 of the mediation model was accepted. Hence, there is no direct effect of application of metadata practices on Librarians' competencies in Federal University libraries in Nigeria.

3. Direct Effects of Librarians' Competencies on Management of DIRs

Table 5. Direct effects of Librarians' competencies on management of DIR

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	22.170	.808		27.433	.000		
Skill	.166	.028	.390	5.935	.000	.884	1.131
Training	-.227	.108	-.139	-2.105	.036	.884	1.131

Dependent Variable: MANAGEMENT. F (2, 226) = 17.615, p = 0.000. R2 =.135 Adj. R2 =.137.

In step 3, a regression analysis was carried out with Librarians' competencies as predictor of management of digital information resources using multiple linear regression analysis (Table 5). Based on the regression model of best fit, skills (*Beta* = .390, *t* (223) = 5.935, *p* = 0.000) had a positive significant influence on management of digital information resources. Hence, the higher the skill sets of librarians on metadata, the higher the management of digital information resources in Federal University libraries in Nigeria. However, training (*Beta* = -.139, *t* (223) = -2.105, *p* = .036), had a negative significant influence on management of digital information resources. This signifies that training received by librarians did not enhance their ability to apply metadata in the federal university libraries of Nigeria.

The model's coefficient of determination value, Adj. R^2 was 0.137 indicating that 13.7% of management of digital information resources was explained by Librarians' competencies in Federal University libraries in Nigeria. However, the model did not explain 86.3% of the variation in management of digital information resources, indicating that there are other factors associated with management of digital information resources which were not captured in the model. Furthermore, the F (2, 226) = 17.165, p = 0.000 revealed that Librarians' competencies was considered statistically significant in explaining management of digital information resources in Federal University libraries in Nigeria. The results from Table 5 show that the predictor equation takes the form:

Management of DIR = 22.170 + .166 Skill

This implies that Management of digital information resources increases by 0.166 when skills are improved by 1 index unit. The study findings also show that skills positively influenced management of digital information resources by a factor of 16.6%. Therefore, the null hypothesis which stated that librarians' competencies has no significant influence on the management of digital information resources in Federal University libraries in Nigeria was hereby rejected.

5. Indirect Effects of Librarians' Competencies on Management of DIR

Table 6. Indirect effects of Librarians' competencies on management of DIR

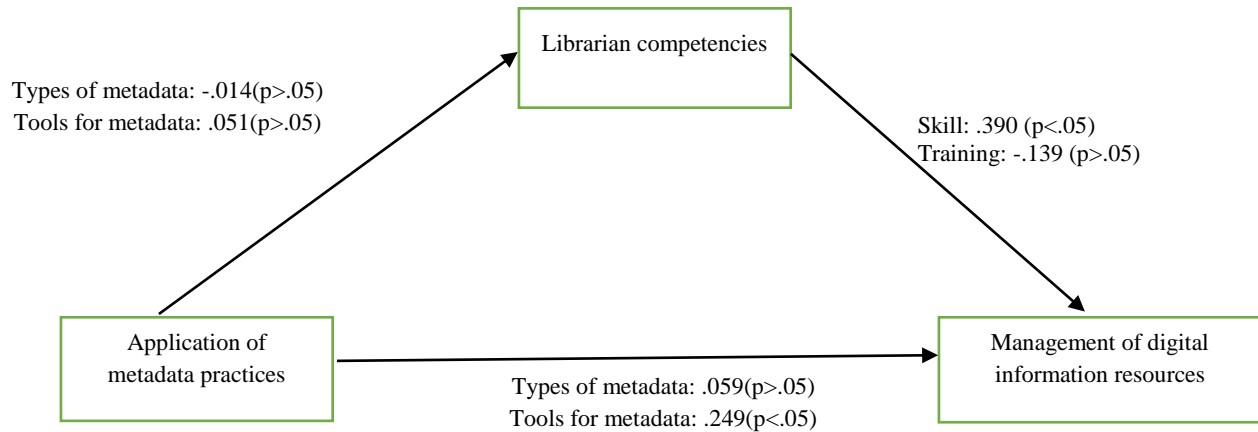|	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	20.502	.920		22.287	.000
Types of metadata practices	.065	.125	.035	.518	.605
Tools for Metadata Practices	.281	.078	.240	3.592	.000
Skill	.158	.027	.373	5.854	.000
Training	-.209	.105	-.127	-1.988	.048

Dependent Variable: MANAGEMENT. F (4, 224) = 14.047, p = 0.000. R^2 =.201 *Adj.* R^2 =.186.

The inclusion of librarians' competencies as a mediating variable in the regression equation intervened in the aforesaid proved relationship between application of metadata practices and management of digital information resources. The change in value of coefficient of tools for metadata (*Beta* = 0.249, p=0.001 to 0.240, p=0.002) were observed due to inclusion of the mediating variable (Librarians' competencies) in regression equation. Thus, there exists a partial mediating effect (0.025). This means that application of

appropriate metadata tools can significantly enhance the management of digital information resources been triggered by the high level of Librarians' skill in Federal University libraries in Nigeria. Therefore, the hypothesis that librarians' competencies do not mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria was rejected.

Resultant Models

The interactions between the independent variables, mediating variables and dependent variable are shown in the resultant models below:

Librarian competencies

Types of metadata: -.014(p>.05)
Tools for metadata: .051(p>.05)

Skill: .390 (p<.05)
Training: -.139 (p>.05)

Application of metadata practices

Management of digital information resources

Types of metadata: .059(p>.05)
Tools for metadata: .249(p<.05)

Source: Author's computation (2023)

FIG 2: A Model of the Mediating Influence of Librarians Competencies on the Application of Metadata Practices for Management of Digital Information Resources

The resultant model in Figure 2 shows that the inclusion of librarians' competencies as a mediating variable in the regression equation intervened in revealing some observable changes in the relationship between application of metadata practices and management of digital information resources. Hence, the assumption that librarians' competencies will mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria is substantiated.

DISCUSSION

The findings of this study shows that, there is a high level of skills possessed by metadata librarians in federal university libraries in Nigeria. This implies that librarians in charge of the management of digital information resources have reasonable ICT skills necessary to carry out effective metadata tasks that would culminate into effective organization, preservation, and accessibility of digital resources. This could be a result of the efforts of many of the universities in providing basic digital and metadata skills to their staff, having recognized the importance of the management of digital information resources. This outcome supported the finding of Atanda, Owolabi and Ugbala (2021) that most library personnel Nigeria have requisite proficiency skills in basic computer operations. Equally, Endouware and Omehia (2022) found out that a majority of the librarians had a basic knowledge of ICT competencies such as word processing, retrieving documents from storage devices, internet surfing, search engines and electronic document delivery'

Furthermore, the analysis revealed that the respondents have more basic ICT skills than core metadata skills. This could imply that metadata education has not been sufficiently integrated into library and information science programs in many Nigerian LIS schools. This could also suggest that they have not been adequately exposed to metadata training (Kanyengo, 2006). This revelation affirmed the finding of Oguntayo and Adeleke (2016) which reported that more than half of the participants of the study were aware of metadata only as it relates and is compatible with RDA. This is an indication that they only had basic knowledge about the concept but were oblivious of its technicalities. Similarly, Adeleke (2016) asserted that not many librarians in addition to their traditional library skills have received formal professional training in practices such as metadata. It is important to note that the skills and knowledge of metadata professionals' is a determinant factor in understanding current practices in the use of metadata standards, schemata and controlled vocabularies for access across distributed digital repositories and resources. As such the acquisition of appropriate skills is required. Without this, it will be difficult to adequately utilize available modern tools which were one of the challenges of early libraries and librarians when automation and modern tools were introduced in many developing countries.

The hypothesis which states that librarians' competencies does not mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria was rejected. The trend worldwide has proved that information resources management had shifted from the traditional format to electronic formats causing a shift and a demand also on the librarians' skills. This suggests that librarians can perform their work effectively if they are skillful enough in their area of practice. Studies like Adeleke (2016), Bamise, Oluwaniyi, and Igbeneghu (2019) and Kaur and Adam (2021) reported inadequate skills for metadata functions largely due to training opportunities. By implication, having basic computer skills is not enough for metadata functions in the library. These studies show that given the needed training which is supposed to facilitate continuous professional development and improvement in metadata skills; librarians will be able to build up confidence and channel their expertise rightly.

CONCLUSION AND RECOMMENDATION

The findings of this study shows that, overall there is a high level of competencies possessed to support the management of digital information resources through the application of metadata practice. The study concluded that librarians' competencies mediate the relationship between application of metadata practices and management of digital information resources in Federal University libraries in Nigeria. This outcome demonstrated a link between the application of metadata practices and the management of digital information resources in federal university libraries. Therefore, it is important that the various university management understudied put metadata ICT skills of librarians and facilitating conditions into consideration when designing and implementing application of metadata practices for the management of digital information resources. A point of limitation for this study is that the researcher is careful not to consider knowledge and behavioral characteristics as part of the definition of competencies, because they are often times more difficult to learn and measure, therefore in the context of this study competencies refer to the

skills (the ability to combine knowledge and principles to create complete and consistent bibliographic record) and trainings acquired by librarians towards applying metadata practices for managing digital information resources.

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