

## **Adoption of Electronic Resources Among Academic Staff in Public Universities in Tanzania: An Examination of Influencing Factors**

*Matilda Kuzilwa\* & Joseph Kuzilwa<sup>§</sup>*

### **Abstract**

This paper examines factors that influence the adoption of electronic resources for the provision of academic activities by faculty members in public universities in Tanzania. A quantitative research design based on a cross-sectional survey of academic staff members in four public universities was used. A sample of 292 academic staff members was obtained through a combination of stratified and proportionate random sampling. Factors found to increase the probability of adopting e-resources include: awareness of e-resources through the availability of ICT policies in universities; coercive pressure on the use of ICT for teaching and research; and perceived adequacy in infrastructural support and capacity built in the use of ICT and e-learning system. The findings show that predisposing factors—age, experience, academic rank and educational level—and triggering factors—like expectation for promotion and increased income—do not have statistically significant influence on adoption. The main implications of the findings are that the use of e-resources in academic institutions can be enhanced through effective communication of ICT policies; creation of awareness on ICT policies and regulations; proper training and other capacity building initiatives to academic staff on the use of ICTs, infrastructure and systems; and applying some form of institutional coercive pressure in terms of enforcing the use of e-resources to spur the adoption of e-resources.

**Keywords:** *adoption, e-resources, predisposing, triggering, enhancing and institutional factors*

### **1. Introduction**

The great leap in the availability of electronic resources during the last three decades has not only opened up opportunities hitherto not available to many academics and academic institutions in the developing world, but it has also enhanced efficiency and effectiveness in the performance of academic activities. As a result of global advancements in ICT, significant efforts have been made in the recent past—with initiatives by both national and international bodies—to launch African universities into the digital society by providing the required networked ICT infrastructure to facilitate access and use of e-resources (Gakibayo et al., 2013; Mutagahywa, 2012).

Efforts have been made in the last two decades to ensure that intellectuals and researchers in Africa are able to access ample growing information now produced electronically. Among the efforts are negotiations done with different publishers, whereby many electronic journals and other databases are now provided free or

---

\* Mzumbe University: mkuz85@gmail.com

<sup>§</sup> Mzumbe University: jakuzilwa@mzumbe.ac.tz

subscribed to at discounted prices. Some of the negotiations have been made possible through programmes like the African Journals Online (AJOL), Access Global Online Research in Agriculture (AGORA), eIFL, JSTOR, Journal Donation Project (JDP) and HINARI (Gakibayo et al., 2013; Omotayo, 2010; Rosenberg, 2006). Also, the International Network for the Availability of Scientific Publications (INASP) initiative, through the Programme for the Enhancement of Research Information (PERI) in 2001, was the first comprehensive attempt to introduce the use of full text electronic journals in the research and academic community in Tanzania (COTUL, 2011; Manda, 2005). These various negotiated networks have enabled Tanzania's public universities, and other nonprofit organisations, to have access to free/heavily discounted e-journals, and other e-resources. The promotion of e-resources among public universities in Tanzania is going hand in hand with the establishment and development of these universities as they aspire to improve the quality of academic outputs. It is, therefore, of interest to examine how the adoption of e-resources is taking place amongst the academic staff of public universities in Tanzania.

Studies conducted across the globe—for example, in India and Nigeria in Africa—have revealed that faculty members in universities tend to vary in their willingness to adopt new methods and innovations in their teaching and research uptake (Almobarraz, 2007; Al Saif, 2005; Alshawi, 2002; Rogers, 1995; Sivathaasan, 2013). There is also anecdotal evidence from some recent studies conducted in Asia and Africa that despite the opportunities and potential benefits from e-resources, these resources seem not to be adopted extensively by academic staff (Gakibayo et al., 2013; Mutagahywa, 2012; Sivathaasan, 2013; Almobarraz, (2007); Al Saif, (2005); Alshawi, (2002); Amusa, Salman, and Ajani, (2013); Kaino et al., (2011).

An extensive study by the Consortium for Tanzania Universities and Research Libraries (COTUL) to explore the trend of e-resource usage in Tanzania's higher learning institutions revealed that the usage of e-resources subscribed through COTUL ranged between 10–80% (COTUL, 2011) for all the institutions involved in the study. The study results also revealed that the trend of e-resource usage differed between those institutions. Among the 55 institutions surveyed in both Mainland Tanzania and Zanzibar Islands, 33 (66%) of the said institutions were subscribers to COTUL/International Network for the Availability of Scientific Publications (INASP) e-resources available. The remaining 22 (34%) did not subscribe to the resources; meaning that the users were probably not even aware of the e-resources from these sources. This implies that users like faculty members did not use the opportunity of available e-resources effectively.

Such variations in the adoption of e-resources amongst institutions and individual academics are quite intriguing. Low utilization of e-resources in Tanzania and Africa will not only lead to a waste of important resources and costly investments made by the government and individual institutions, but may also lead to an increase of the knowledge gap between the South and the North. Factors influencing low utilization needs to be unearthed for proper intervention.

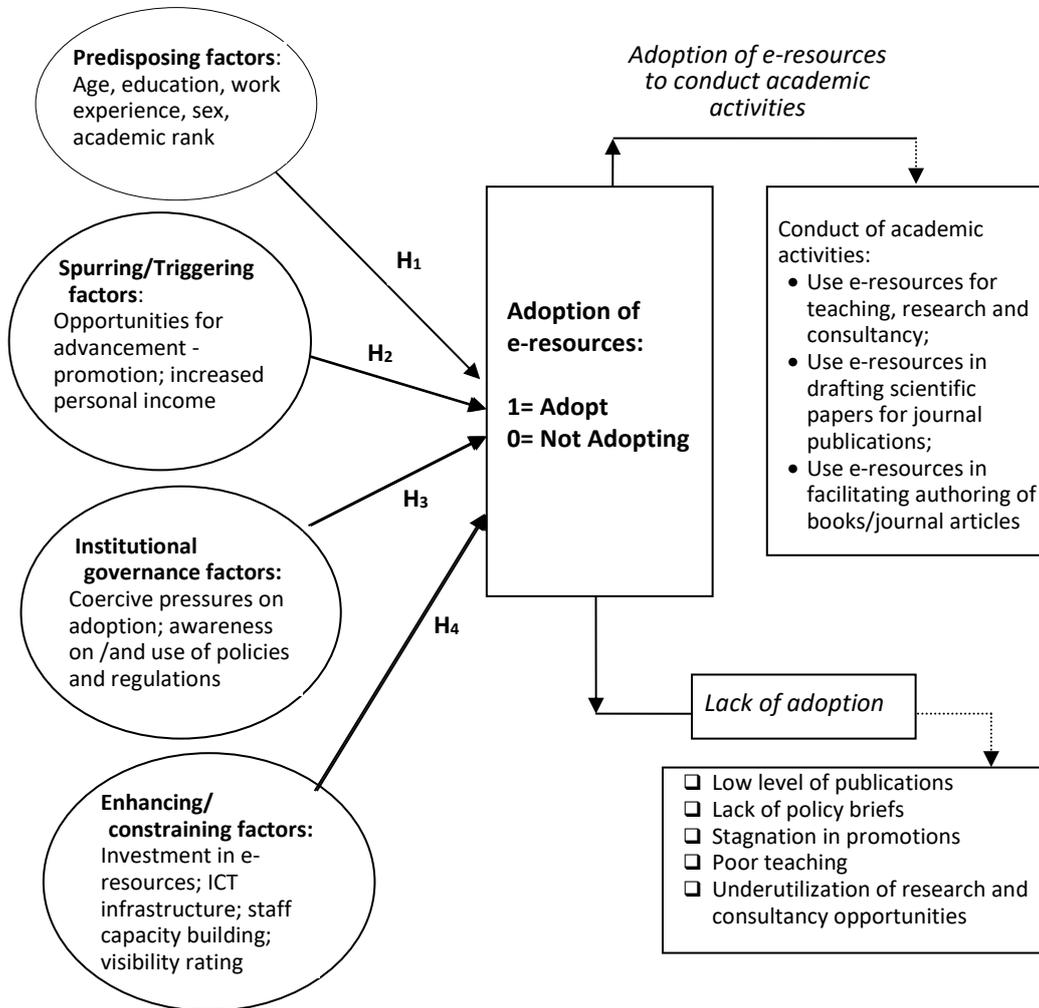
Spotts and Bowman (1995) revealed that the adoption process with regard to e-resources, in the epoch of the development of information technology (IT), takes place in organisations depending on factors such as resource allocation for subscribing to e-resources, Internet access and use, individuals' levels of education, and individuals' motivation or interest to adopt innovations to improve teaching or student learning. It is against this background that this study and paper examine what influences the adoption of e-resources for accomplishing the academic activities of teaching and research among faculty members in Tanzania's public universities.

## **2. Conceptual Framework**

The conceptual framework of this paper is informed by three theories: (i) the Technological Acceptance Model (TAM) by Davis (1989), as the main theory; but complemented by (ii) the institutional theory in the tradition of North (1990); and the entrepreneurship theory in the tradition of Binks and Vale (1990) as used by McCormick (1996) and Kuzilwa (2005). According to the TAM, users may adopt the use of available technology such as e-resources at a university if they perceive there is some benefits or usefulness of using them. Therefore, according to the TAM, one of the factors influencing adoption is perceived usefulness (PU). Also, for adoption to happen, and as a second factor influencing adoption, this has to be accompanied with what the TAM refers to as perceived ease of use (PEOU). The perceived advantages for academic staff can be interpreted as opportunities for promotion and advancement, which are termed as triggering factors in the entrepreneurship theory (McCormick, 1996). According to the TAM, the PU and PEOU can be influenced by external factors (to the individual). As for e-resources or other information technologies, infrastructure (hard and soft), and the extent of capacity building to use e-resources could promote or constrain ease of use of e-resources.

But ease of use could also be affected by institutional factors by way of rules and regulations guiding the adoption of e-resources. Therefore, this is also introduced via the institutional theory originally propagated by North (1990, 1995). By taking on board the institutional theory, the framework adopts a university formal and informal rules and regulations or policies, which are anticipated to influence the behaviour of faculty members on the attitude of, and decision on, whether to adopt electronic resources for the delivery of academic activities. Institutional rules and regulations are also seen to create or enhance awareness of the technology.

The context of adoption is further elaborated by bringing important aspects of the entrepreneurship theory, which recognize personal characteristics as important in influencing change (Isaga, 2012). Personal characteristics in the case of university faculty members include age, education, academic rank, and experience of a faculty member. These factors, according to the entrepreneurship theory by McCormick (1996) and Kuzilwa (2005), are termed as predisposing factors. This conceptual framework is as presented in Figure 1, and is used to develop the econometric model for the study.



**Figure 1: Conceptual Framework**

Source: Adopted from Kuzilwa (2005)

### 3. Methodology

The study is based on cross-sectional dataset originating from a survey of faculty members from four public universities in Tanzania. A structured questionnaire was prepared and used in data collection. A stratified proportionate sampling technique was used to have a fair distribution of the faculty members in each of the four universities. The population of academic staff in public universities was stratified by universities. Hence, there were eight strata reflecting the eight universities selected for the study. Four universities—namely, the University of Dar es Salaam (UDSM), Sokoine University of Agriculture (SUA), Muhimbili University of Health and Allied Sciences (MUHAS) and (Mzumbe University) MU—were picked. The total

population of academic staff in the four universities at the time of the fieldwork was 2,459, as follows: 1,300 (53% of the total) staff at the UDSM; 520 (21% of the total) at the SUA; 284 (12% of the total) at the Mzumbe University; and 355 (14% of the total) at the MUHAS. Because of differences in the composition, categorization and nomenclature of the academic units amongst public universities, no attempt was made to stratify further the sampled universities by academic units.

To ensure a fair representation of the population in the chosen sample of 292 faculty members, proportionate stratified sample reflecting the population in the strata was used to allocate sub-samples as follows: 155 (53%) faculty members from the UDSM, 61 (21%) faculty members from the SUA, 35 (12%) faculty members from the MU, and 41 (14%) of faculty members from the MUHAS.

The staff lists as contained in the seniority lists maintained by each university and supported by staff lists in the university prospectuses were used to draw the samples from the strata. The lists were obtained from the HR offices in the respective universities upon clearance from the offices of the deputy vice-chancellor responsible for academic affairs. Systematic sampling, based on the staff seniority lists, was used to draw the respondents in each university. In particular, every sixth academic staff in the respective lists was sampled and—through the help of administrative staff—was given a questionnaire to fill. The application of this approach ensured that the principle of random selection was not violated (see, Nachmias & Nachmias, 1996).

#### **4. Econometric Model Specification**

The main objective of the study was to examine factors that influence the adoption of e-resources by faculty members. Because the dependent variable is binary, the binary choice model is the proper one to use, and allow the dependent variable to be interpreted as a probability (Pindyck & Rubinfeld, 1981: 274). Three binary choice models exist: the linear probability model, probit model, and the logit model. The probit and logit models are transformed version of the linear probability model, developed to address the weaknesses in the latter, including that of yielding biased prediction (Pindyck & Rubinfeld, 1981: 277). While the probit model could have been used, this study chose the logistic model because it is more robust to outliers compared to the probit model. Therefore, logistic regression analysis was performed to show the relationships between adoption of e-resources (as a dependent variable) among academic staff, and various independent variables namely triggering, predisposing, institutional governance, and enhancing factors. The responses in the Likert scale of adoption and each subcategory of factors influencing adoption were subsequently transformed into a binary form, resulting into dichotomous dependent and independent variables. This approach led into a binary choice decision, and hence the application of binary choice model. According to the binary choice models, individuals are faced with two alternatives and the choices they make depend on the characteristics of the individual (Pindyck and Rubinfeld, 1981, p. 274). In such a circumstance, responses may take a unit value for one choice with a positive decision, and the remaining observations may take a zero value.

Therefore, the approach used to analyse adoption of e-resources in this research is based on binary choice models which describe the probability of faculty member's choice between the two mutually exclusive choices: adopt or not adopting. In particular, the models determine the probability that an individual with a given set of attributes will make one choice as opposed to the alternative.

The logit model is based on the cumulative logistic probability function:

$$P_i = F(Z_i) = F(a + \beta X_i) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(a + \beta X_i)}}$$

Where,  $P_i$  is the probability that a faculty member will use e-resources in delivering of core activities, and  $X_i$  are the factors influencing the probability choice.

Through manipulation as elaborated in Pindyck and Rubinfeld (1981: 289), it can be shown that:

$$Z_i = \log \frac{P_i}{1 - P_i}$$

And hence

$$\log \frac{P_i}{1 - P_i} = \alpha + \beta X_i$$

The dependent variable is the logarithm of the odds that a particular choice (in this case adoption or otherwise) will be made. The  $X_i$  is a vector of explanatory variables.

The logit model has the ability to overcome shortcomings of other models as it has the powers to generate bounded probability estimates for each observation (Tambi et al., 1999).

The quantitative analysis was based on an econometric model, the logistic regression model. The focus was on deducing factors that influence adoption of e-resources and determining the level of their effect. The Logistic regression model was employed to measure factors contributing to the adoption of e-resources in the delivery of core academic activities. Also, it should be kept in mind that the following factors were instrumental in reaching a decision to choose the logistic regression model over the other: (i) the model provides greater reliability in analysing binary choice decisions, (ii) availability and flexibility of computer software, and (iii) some past studies applied the logistic regression to analyse the respondents' adoption. For example, to get consistent results, the five-point Likert scale responses were transformed into binary values to suit the binary regression analysis in a study (Lwoga and Questier, 2014).

The general form of the logistic regression model was:

$$Z_i = \log \frac{P_i}{1 - P_i}$$

Where,  $P_i$  is the logarithm of the odds that a faculty member will use e-resources in the delivering of core activities.

$1 - P_i$  is the odds that the academic staff is not using e-resources in the delivery of core activities. These decisions are influenced by the faculty members' attributes ( $X_i$ ). It is from the above presented general model that the logistic regression model specified in this study was used as follows:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \mu_i$$

Where,

- $Z_i$  = Binary dependent variable which lies between (0,1), that is "1" if academic staff is using the e-resources approaches and "0" if otherwise
- $\beta_0$  = Constant term or intercept
- $\beta_1$  = Coefficients of the respective explanatory variables
- $X_1, \dots, X_2$  = Explanatory variables included in the model
- $\mu_i$  = Error term or residual term

The general test was as that:

$$Z_i = \{1 \text{ if the academic staff adopts e-resources, } 0 \text{ otherwise}\}$$

According to Pindyck and Rubenfield (1981) when using the logit model with individual observations, the most suitable estimation technique is that of maximum likelihood.

In the case of random sampling where all the observations are sampled independently, the contribution of the  $i^{\text{th}}$  observation is written as:

$$P_i^{Y_i} (1 - P_i)^{1 - Y_i}$$

and therefore, the likelihood function will be given as:

$$L = \prod_i^n P_i^{Y_i} (1 - P_i)^{1 - Y_i}$$

Taking logarithm to both sides and replacing  $P_i$  by  $e^{\beta X_i} / 1 + e^{\beta X_i}$  the log-likelihood function becomes:

$$\text{Log}L = \sum_i^n Y_i \beta X_i - \sum_i^n \log(1 + e^{\beta X_i})$$

In this model with a binary dependent variable, the parameters  $\beta$ 's are interpreted as the marginal effect on the conditional probability and are given as  $dp_j/dx_j$ , which gives the rate of change in the probability as a result of a unit change in the independent variable (Ilembo et al., 2017).

The maximum-likelihood estimation is desirable because all parameter estimators are consistent and efficient for large samples. Also, the significance of all subset of coefficient in the logit model when maximum-likelihood is used can be done using the chi-square distribution test (Pindyck & Rubinfeld, 1981: 311).

### **Explanatory Variables**

The explanatory variables used in the study to examine faculty members' adoption of e-resources were pre-determined through the conceptual framework discussed above. Specifically, there are four categories of explanatory variables as explained below with a rationale for their inclusion.

The first category is predisposing (demographic) factors. These are related to the entrepreneurship theory where they act as opportunities that push faculty members to adopt e-resources, and include:

- *Age* of a faculty member (Age): the direction of relationship is not predetermined. On the one hand, it could be that young academics are more proactive when it comes to the use of ICTs, and hence also the use of e-resources;
- *Experience* in the academics: this indicates the number of years a faculty member has been in the university industry. This can either increase or decrease the probability of using e-resources;
- *Education*: this is the education level of a faculty member, which is either Master's degree and/or PhD. The level of education can increase the probability of using e-resources;
- *Academic Rank* (Acarank): university academic ranks in the case of Tanzania ranges from assistant lecturer to full professorship. The probability in the use of electronic resources is expected to increase with rank.

The second category is the triggering factors, i.e., those factors that trigger action, and include possibilities for increased income arising from academic activities, through the usage of e-resources in teaching, research and/or consultancy. They include:

- *Increaseinc*: this is increase in incomes from various academic activities like consultancy and research. The possibility for increased income is expected to positively increase the probability of adoption. According to the TAM, this is a perceived benefit.

- *Eagerprom*: this is eagerness for promotion arising from using e-resources to meet publication requirements for promotion. Eagerness for promotion is also interpreted as a perceived benefit, which influences the probability of adopting e-resources.

The third category is institutional governance factors, which relate to the institutional theory, and include:

- *Compress*: these are institutional coercive pressures to use e-resources; and may be in the form of policy and regulations.
- *Awareness*: this is the creation of e-resources opportunities in terms of what is available.

The final category is enhancing factors (*Enhanc*), which relate to available supportive infrastructure for e-resources, and also capacity building on the use of e-resources. This also relates to the entrepreneurship theory factors, where institutional investment in ICTs—including LAN, Internet connectivity, servers, academic search engines, and other hard and software—are likely to speed up innovations in the adoption of e-resources in conducting various academic activities.

Before running the logistic regression analysis, a correlation analysis was conducted on all independent variables. This was prompted by the fact that the way some of the independent variables were measured was similar. For example, *age* and *experience* were both measured in the number of years. Since regression analysis comprises all independent variables—including those that have the likelihood of moving together—it is important to see the possibility of multicollinearity. The results of the correlation analysis showed that there is a sizeable correlation between age in years and experience in years. The coefficient of the correlation between three variables was 0.764; and was statistically significant with a *p*-value of 0.000. Given this revelation, the model was estimated several times to control for the effect of possible multicollinearity. The *Age* variable was transformed into *Age* squared. Other variables included were *experience* (in years), eagerness for promotion (*eagerprom*), academic qualifications (*academqual*), enhancing factors (*enhanc<sub>1</sub>*), awareness of institutional policy (*awareness*), competitive pressure (*compress*), and academic rank (*acarank*).

## **5. Results and Discussion**

### **5.1 Profile of the Respondents**

Table 1 presents the descriptive statistics of the respondents based on the demographic variables in the model. This has been carried out separately for the adopters and non-adopters of e-resources based on the adoption rule used. The results show that there is no statistically significance difference between adopters and non-adopters as far as academic qualification is concerned. The results in Table 1, however, show that adopters are relatively young, of lower academic ranks, and those that have just joined the university academic career.

**Adoption of Electronic Resources among Academic Staff in Public Universities**

**Table 1: Descriptive Statistics of the Profile of the Respondents**

Variable	All Respondents		Adopters		Non Adopters		p-value
<b>Age</b>	Count	%	Count	%	Count	%	0.006***
20-29	16	5.5	11	3.8	2	0.7	
30-39	124	42.5	98	33.6	19	6.5	
40-49	78	26.7	57	19.5	24	8.2	
50-59	42	14.4	33	11.3	12	4.1	
60+	32	11.6	18	6.2	18	6.2	
<b>Qualifications</b>							
Master's Degree	147	50.3	115	39.4	32	11	0.123
PhD	145	49.7	102	34.9	43	14.7	
<b>Academic Rank</b>							
	Count	%	Count	%	Count	%	0.006***
Lecturer and below	183	62.6	146	37	37	12.6	
Senior Lecturer, Associate and full Professor	109	37.3	71	24.3	38	13	
<b>Experience (years)</b>							
Less than 5 years	60	30.5	53	88.3	7	11.7	0.004***
6-10	91	31.1	73	80.2	18	19.7	
11-15	56	19.2	38	67.9	18	32.1	
16-20	22	7.5	14	63.6	8	36.4	
More than 20	63	21.5	39	61.9	24	38.1	

**5.2 Estimation Results**

Table 2 presents the maximum likelihood estimates of the Logit model. The results show the co-efficient of determination (pseudo R<sup>2</sup>) of 0.1040, which is slightly outside the acceptable range. According to McFadden (1974), a pseudo R<sup>2</sup> of between 0.2 and 0.4 represent a good fit for logit models.

**Table 2: Maximum Likelihood Estimate of the Logit Model**

Variable	Coefficient	Std error	P-Value	Marginal Effect
Constant	1.057363	1.426913	0.459	
Acarank	-.3148342	.4315332	0.466	-.0570773
Compress	.7825003	.3462399	0.024**	.1535131
eagerprom	.0717406	.3699351	0.846	.0128792
Enhanc	.6085767	.3446609	0.077*	.1029172
Age	.0414809	.0453227	0.360	.0073652
Experience	-.0429298	.033009	0.193	-.0076225
Awareness	.6119862	.3127417	0.050*	.1086626
Agesq	-.1076335	.069669	0.122	-.0191111

**Notes:** Number of obs = 292; LR chi2(8) = 34.79; Prob > chi2 = 0.0000;  
Pseudo R2 = 0.1046; Log likelihood = -148.96766

However, the log likelihood is 148.967, and the likelihood ratio of chi-square statistic is equal to 34.79 with 8 degrees of freedom; and is significant at 1 percent. This leads us to reject the null hypothesis that the parameters of all explanatory variables are jointly equal to zero at 1 percent level of significance. It can be concluded that the explanatory power of the logistic model is satisfactory, and therefore the model can be used to explain the probability of adoption of e-resources by the academic staff in public universities.

The results according to the marginal effects in Table 2 show that increasing the capacity on the use of e-resources (*Enhanc*) by 1 unit, increases the probability of adopting e-resources by 10 percentage points, with a significance of  $0.077 < 0.1$ . Thus, we reject the null hypothesis that the coefficient of this explanatory variable is equal to zero at 10 percent level of significance. This suggests that building capacity on the use of e-resources does have a significant effect on adoption.

The results also show that increasing competitive pressure in the academics (*Compress*) by one unit increases the probability of e-resources adoption by 15 percentage points, with a level of significance of  $0.024 < 0.05$ . Thus, we reject a null hypothesis that the coefficient of this explanatory variable is equal to zero at 5 percent level of significance. The results suggest that *competitive pressure*, as advanced by the institutional theory, do increase the probability of adopting e-resources by academic staff in public universities in Tanzania.

The results further show that increasing awareness of e-resources through policy increases adoption by 10 percent, with a significance level of  $0.05 < 0.1$ . Thus we reject the null hypothesis that the coefficient of this explanatory variable is equal to zero.

The above results are in line with the prediction of the institutional theory, which shows the significance of formal rules, regulations and institutional competitive pressure; as well as awareness creation in influencing individual behavior. The results are also in line with the entrepreneurship theory in the tradition of Binks and Vale (1990) and McCormick (1996), which predicts that enhancing factors—such as capacity building and training—can influence individual decisions.

The significance of awareness in the adoption of e-resources is also supported by results from a number of global studies. For example, a study by Ernest (2015) in two private universities in Ghana found low e-resource use to have been influenced by low awareness of such resources. Also, a study by Amusa et al. (2013), in four universities in Nigeria, revealed a low awareness by lecturers on the electronic resources subscribed to by their libraries to be a significant cause of low e-resource use.

On the other hand, the results of this study show that *Age*, *experience*, *academic rank* and *eagerness for promotion* do not have significant influence on the adoption of e-resources, and hence we cannot reject the hypotheses that the coefficients of each of these variables are not equal to zero. Age, experience and academic rank were

identified as predisposing factor under the entrepreneurship theory, while eagerness for promotion was identified as a triggering factor under the entrepreneurship theory. It was also seen as a possible perceived benefit under the TAM. Hence, these results are not supporting the prediction of these theories as far as the influence of these variables is concerned in e-resources adoption. Moreover, these results on the influence of demographic variables are similar to those by Ani (2013), which showed demographic variables to have a statistically insignificant influence on the adoption of e-resources.

## **6. Conclusion**

The results from the logistic regression analysis show that competitive pressure on the use of e-resources, awareness of rules and regulations on ICT, and organizational support (*Enhanc*) have significant effects on the adoption of e-resources. It is concluded from the findings that institutional factors, as well as organizational support through capacity built in the use of ICT and e-learning system, have a significant influence on the adoption of e-resources.

On the other hand, all predisposing factors—including age, experiences, level of education and academic rank—have no significant influence in adoption of e-resources. While these results were supported by some similar studies—for example, Okiki, 2011, Ani (2017), and Ernest (2015)—the results were also incongruent with others, for example, Mwantimwa and Elia (2017), Tenopir (2003) and Mtega et al. (2014). This continues to make the role of demographic factors in influencing e-resources inconclusive.

Also, the influence of triggering factor taken as perceived usefulness or benefits -- represented by expected promotion—was also found to have no significant influence in the adoption of e-resources for delivery of academic activities. This may not be strange considering that promotion in universities requires one to stay in a particular position performing academic work satisfactorily for at least three years, irrespective of whether the publication requirement has been met in less than that duration.

## **7. Policy Implication**

Basing on the findings and conclusions four main policy implications can be drawn. Firstly, necessary and relevant investment in ICTs (infrastructure and systems) should be undertaken to prompt the use of the same in employing e-resources. Such investments should spread evenly and should not discriminate between junior and senior staff, or between young and older academics.

Secondly, to enhance e-resources adoption, proper training and other capacity building initiatives on the use of ICTs infrastructure and systems should be given to academic staff. Again, this should be evenly spread, irrespective of seniority, experience or age.

Thirdly, awareness of the availability of various types of e-resources should be created through various modes: multiple communication channels, and through policies on the use of ICTs and e-resources.

Fourthly, some form of coercive pressure in terms of enforcing the use of e-resources to maintain personal and institutional visibility may need to be applied institutionally to spur adoption of e-resources. This should go in tandem with capacity building and awareness creation.

This study was confined to studying the adoption of e-resources in the public universities. Future researches should consider comparing adoption of e-resources in both public and private universities. Also, the study did not distinguish adoption of e-resources among specific academic activities, i.e., teaching, research and public service. Future researches should distinguish usage and determinants of adoption of e-resources for different academic activities, instead of lumping them together. Related to this is that this study did not distinguish adoption of e-resources across different academic disciplines. There is a possibility that adoption may vary across academic disciplines.

## References

- Almobarraz, A. (2007). *Perceived Attributes of Diffusion of Innovation Theory as Predictors of Internet Adoption among Faculty Members of Imam Mohammed Bin Saud University*. University of North Texas. Retrieved on July 13: 2015 from the www: <http://digital.library.unt.edu/ark:67531/metadc3710/ml/54/>.
- Alshawi, A. M. (2002). *Investigating predictors of faculty Internet usage*. Ph.D. thesis George Mason University, Virginia. Retrieved on July 13: 2015 from the World Wide Web: [www.editlib.org/p/126022/](http://www.editlib.org/p/126022/).
- Amusa, O. I., Salman, A. A. & Ajani, F. O. (2013). Knowledge and Use of Electronic Information Resources by Academics in Colleges of Animal Production, Animal Health, and Veterinary Medicine in Nigeria. *International Journal of Library & Information Science*, 3. (4). 705 - 718. Retrieved on January 11: 2014 from: [www.irjilis.com/wp-content/uploads/2013/12/9\\_IRI64.pdf](http://www.irjilis.com/wp-content/uploads/2013/12/9_IRI64.pdf).
- Ani, O. E. (2013). *Accessibility and Utilization of Electronic Information Resources for Research and Its Effect on Productivity of Academic Staff in Selected Nigerian Universities Between 2005 and 2012*. Doctoral dissertation. Retrieved on May 9: 2015 from: <http://www.Casaa.unm.edu/download/Background%20and20%20Significance.pdf>.
- Binks, M. & Vale, P. (1990). *Entrepreneurship and Economic Change*. London: McGraw-Hill.
- Consortium of Tanzania Universities and Research Libraries (COTUL). (2011). *Report on a Survey on Access and Usage of E-resources in Tanzania*. Mimeo.
- Damayanthi, K. P. N. (2006). *An Assessment of Electronic Information Resources Usage and Management: A Case Study at University of Peradeniya*. MLS thesis, University of Colombo.

- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3): 319–340. Analysis of Referral URLs. *Library and Information Science Research*, 32(3): 221–228.
- Ernest, Baakye (2015). Accessibility and Utilization of Scholarly Electronic Journals by the Academic Staff of Garden City University College and Christian Service University College, Kumasi, Ghana. MPhil thesis, University of Ghana.
- Gakibayo, A., Odongo, I. & Obura, C.O. (2013). Electronic Information Resources Utilization by Students in Mbarara University Library. *Library Philosophy and Practice (e-journal)*. Retrieved on February 7: 2014 from: <http://digitalcommons.unl.edu/libphilprac/869>.
- Ilembo, B. M., Kuzilwa, J.A. & Henningsen, A. (2017). Tobacco Contract Farming in the Urambo District of Tanzania: Which Farmers Obtain Inputs on Credit and Which Buys Them for Cash? In: J.A. Kuzilwa, N. Fold, A. Henningsen and M.N. Larsen (Eds.). (2017). *Contract Farming and the Development of Smallholder Agricultural Businesses: Improving Markets and Value Chains in Tanzania*. New York, Routledge.
- Isaga, N. (2012). *Entrepreneurship and the Growth of SMEs in the Furniture Industry in Tanzania*. Doctoral Research Report, Vrije Universiteit. ISBN 978–94– 6191–279–4.
- Kuzilwa, J. A. (2005). The Role of Credit for Small Business Success: A Study of the National Entrepreneurship Development Fund in Tanzania. *The Journal of Entrepreneurship*, 14(2). 131 - 161.
- Lwoga, E. T. & Questier, F. (2014). Faculty Adoption and Usage Behaviour of Open Access Scholarly Communication in Health Science Universities. *New Library World*, 115(3/4): 1–22.
- Manda, P. A. (2005). Electronic Resource Usage in Academic and Research Institutions in Tanzania. *Information Development* (ISSN 0266–6669). 21(4): 269–282.
- McCormick, D. & Pedersen, P.O. (1996). *Small Enterprises: Flexibility and Networking in an African Context*. Nairobi: Longhorn.
- McFadden, D. (1974). Conditional Logit Analysis of Qualitative Choice Behaviour. in P. Zarembka (ed.). *Frontiers in Econometrics*. Academic Press. <http://eml.berkeley.edu/~mcfadden/travel.html>.
- Mutagahywa, B. (2012). The Role of ICT in University Governance in Tanzania, Conference Proceedings – 4<sup>th</sup> Higher Education Forum, held at Naura Springs Hotel, 13<sup>th</sup>–14<sup>th</sup> August 2012.
- North, D. C. (1993). *Institutions: Institutional Change and Economic Performance*. Cambridge: Cambridge University Press. ISBN 0–521–39734–0.
- Pindyck, R. S. & Rubinfeld, D. L. (1981). *Econometric Models and Economic Forecasts*. New York: McGraw-Hill.
- Sivathaasan, N. (2013). Use of Electronic Information Resources and Academic Performance of University Teachers: A Case Study. *European Journal of Business and Management* (ISSN 2222–1905(Paper) ISSN 2222–2839(Online), 5(14). 23 – 32. Retrieved on March 28: 2014 from [www.iiste.org](http://www.iiste.org).