The 2nd Conference of business, Arusha - Tanzania
Hosted on 24th – 25th November 2021
ISSN: 2714-1993

****Original Research****

EFFECT OF TECHNOLOGICAL INFRASTRUCTURES ON ADOPTION OF E-PROCUREMENT IN TANZANIA: A CASE OF ARUSHA REGION

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ABSTRACT

The purpose of this study was to evaluate the effects of technological infrastructures on the adoption of e-procurement in the Arusha region. The study was guided by the technology acceptance model and diffusion of innovation theory. The descriptive research design was used to explain technological infrastructures on the adoption of e-procurement in the Arusha region. Both quantitative and qualitative approaches were adopted in this study where the sample size used was 201 from all Arusha region districts. The study findings show that technological infrastructures are significant factors for explaining the adoption of e-procurement in the Arusha region. The study recommended that government should ensure that it is fully supplied with ICT infrastructures to provide room for easy adoption of e-procurement in the Arusha region.

Keywords: e-procurement, technology, technological infrastructure, ICT

1.0 Introduction

E-procurement is among the essential procurement tools in many countries (Thysenn, 2021). Local governments adopt an e-procurement system to cope with the increasing procurement complexity (Chepng'etich, Waiganjo & Ismail, 2020). There are some very important benefits to e-procurement that have made many countries adopt, among them includes; saving costs associated with paper-based systems, ensuring transparency through making sure that procurement procedures conform to your policies, increased productivity since the use of templates means paperwork can be filled out more quickly, increased transaction speed, improved standardized buying and reduced errors (Belisari, Binci & Appolloni, 2020:Belisari, Appolloni & Cerruti, 2019).

Various studies have been conducted on e-procurement adoption, implementation, and the entire challenges. For example, Rosli and Songip (2017) conducted a study on the effectiveness of e-procurement in Malaysia and reported that even though e-procurement had many benefits in organizations, its adoption faced various challenges such as inadequate infrastructures and legal aspects. The study indicated that the government strived to ensure that e-procurement is in place at any cost because e-procurement system is the high-tech elements that have of the procurement system containing four aspects; that is electronic evaluation, electronic sourcing, electronic design, and electronic negotiation.

Apart from all the myriads of benefits of e-procurement in the public sector in Tanzania, the journey towards its adoption was not easy. The public sector faced many challenges during its adoption as well as its implementation. Because currently, e-procurement is mandatory in the public sector in Tanzania since December 2020, there is a need to investigate the challenges for the adoption of e-procurement in Tanzania's public sector.

In Tanzania, various studies have been conducted on e-procurement. Among them includes the study by Shatta, Shayo, and Layaa (2020), Nziku and Siwandeti (2019) studied factors affecting adoption of e-procurement in private companies in Tanzania studied the Influence and linkage of buyers'-suppliers' attitude towards e-procurement adoption in developing countries: Tanzania context, Makoba, Nyamagere and Eliufoo (2017) and Amani (2015) who assessed the effects of e-procurement in enhancing project performance among private sector organizations in Dar es Salaam.

1.1 Purpose of the study

This study examined effects of technological infrastructures on the adoption of e-procurement in Tanzania public sector: A case of Arusha Region

2.0 Literature Review

2.1 Electronic Procurement

E-procurement is the process of conducting all purchasing processes using the internet or an organization´s intranet to procure products and services used in the conduct of an organization´s business. E-procurement systems are believed to streamline all aspects of the purchasing process in the meantime applying tighter and transparent control over spending and preferences of products or items, e-procurement helps companies enabling them to decentralize their operational procurement processes and centralize their strategic procurement processes as a consequence of extreme transparency in the supply chain which is provided by e-procurement (Alphonce, 2020).

2.2 Technology acceptance model (TAM)

The technology acceptance model (TAM) was developed by Davis in 1995. The model is an information systems theory that explains how users come to accept and use technology. It is the degree to which a person believes that using a particular system would be free from effort. In the context of this study, the model explains why people adopt technology (e-procurement).

According to Kamal, Shafiq, and Kakria (2020), the purpose of this model is to explain and predict the acceptability of information technology, analyzing and exploring factors influencing the acceptability of certain information technology. TAM points out that perceived usefulness and perceived ease of use are two factors that can affect the attitude. According to the model, the behavioral intention has a positive and substantial effect on actual behaviors. The model explains that employees' perceived usefulness, perceived ease of use, and usage of the software were significantly and positively correlated. Scherer, Siddiq, and Tondeur, (2019) found that because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision-makers concerning the successful adoption of them, people from attitudes and intentions toward trying to learn to use the new technology before initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions.

2.3 Empirical Literature Review

E-procurement is the evolution of traditional paper-based procurement activities towards a more integrated and digitized process. According to Chen, et al, (2021), e-procurement has therefore been around for much longer than the term itself which first came into usage after the establishment of the internet in the 1990s. From the 1960s until the mid-1990s, e-procurement primarily took the form of electronic data interchange (EDI).

Furthermore, Afolabi, et al (2019) shows that e-procurement paves the way for greater speed in purchasing products and services while reducing expenditure because of the choices and completions which increase. It is an obvious fact that before adopting and implementing any new technologies, putting into practice any initiatives, or making any new changes, organizations figure out reasons for using and implementing initiatives or changes. When it comes to adopting e-procurement systems or electronic solutions, first of all, companies will consider the requirements of the company and reasons for adopting e-procurement.

Procurement is essential for the development of economies and as a result government, policymakers, business practitioners, and academia are giving it much more attention than ever. The benefits of e-procurement in terms of promoting the achievement of these goals have been widely noted, particularly through enhanced transparency, such as Issa and Ntimbwa (2020) indicated that procurement of goods, works, and services through internet-based information technologies (e-procurement) is emerging worldwide with the potential to reform processes, improve market access, and promote integrity in public procurement. E-procurement, when properly designed, can drastically reduce the cost of information while at the same time facilitating information accessibility.

Brandon-Jones and Kauppi (2018) examined the antecedents of the technology acceptance model within e-procurement. It was found that the improved technology has promoted the adoption of e-procurement to benefit from improved access, transparency, accountability, corruption control, efficiency, the value of money and integrity as well as the quality of procurement data.

2.4 Research Gap

The benefits of e-procurement in terms of promoting the achievement of procurement goals have been widely noted, particularly through enhanced transparency, accountability, and cost reduction.

In Tanzania, there is inadequate information about how technological infrastructures affect the adoption of e-procurement, especially in the Arusha region. Various studies have been conducted on e-procurement in Tanzania. Among them includes the study by Shatta, Shayo, and Layaa (2020), Nziku and Siwandeti (2019) studied factors affecting adoption of e-procurement in private companies in Tanzania studied the Influence and linkage of buyers'-suppliers' attitude towards e-procurement adoption in developing countries:

Among the reviewed studies none examined challenges for adoption of e-procurement in the public sector specifically in Arusha District Council thus creating a knowledge gap. This study, therefore, filled the gap by examining the challenges for adoption of e-procurement in Tanzania public sector: A case of Arusha Region.

3.0 Methodology

3.1 Research Design

Sileyew (2019) defined research design as a framework of research methods and techniques chosen by a researcher. To achieve the objective of the study, the descriptive survey research design was used. The design was used to obtain information that describes the existing phenomena by asking individuals about their perceptions, attitudes, and values. Therefore, the descriptive survey research design helped to achieve the main objective of the study.

3.2 Research Approach

The research approach is a plan and procedure that consists of the steps of broad assumptions to detailed methods of data collection, analysis, and interpretation. It is, therefore, based on the nature of the research problem being addressed (Kelley-Quon, 2018). The study applied the mixed research approach to address research questions. The approach was also used because the mixed approach expands and strengthens and therefore, contributes to answering questions. Thus, the approach helped the researcher achieve the main objective of the study.

3.3 Sample Size and Sampling Technique

In this study, the sample size of 201 representatives was obtained as stipulated by Yamane (1973). The sample size should neither be excessively large nor too small; it should be optimum which fulfills the requirement of efficiency, representativeness, reliability, and flexibility Yamane (1973). The sample size was obtained through purposive and random sampling technique where respondents were grouped into different groups based on gender, age, and level of education then respondents were selected randomly.

3.4 Data Collection Methods

Questionnaires were used to collect information from respondents in Arusha Region. According to Thysen, et al (2021), questionnaires have many advantages such as being practical, large amounts of information can be collected from a large number of people in a short period, and in a relatively cost-effective way data collection.

In this study, closed-ended questionnaires were used to collect numerical information. The questionnaires had five options for respondents to indicate their level of agreement, undecided or disagreement as follows: 1= Strongly Disagree, 2= Disagree, 3= Undecided 4= Agree and 5 = Strongly Agree.

3.5 Data Analysis Technique

Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings (Vaske, 2019). In this study, data were analyzed using regression and correlation analysis. The method of correlation was used to analyze the extent and the nature of relationships between different variables. Correlation analysis was used to understand the nature of relationships between two individual variables. A correlation reflects the strength and/or direction of the relationship between two (or more) variables. The direction of a correlation can be either positive or negative. Interpretation of findings was done using a five-point Likert scale.

3.6 Validity and Reliability

According to Middleton (2020), validity refers to how accurately a method measures what it is intended to measure. The researcher conducted a pre-study where he provided a few questionnaires to respondents to test for the validity of answers Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable (Middleton, 2020). In this study, the reliability of data collection instruments will be done through pilot testing. Data were tested through SPSS to ensure internal consistency. The test that yielded a Cronbach's Alpha of above 0.7 was regarded as reliable. Items in the study were found reliable as Cronbach Alpha value found was way above 0.7 i.e. 0.845

Table 3. 1: Cronbach Alpha Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
0.845	15

4.0 Presentation of Findings

4.1 Demographic Information

The socio-demographic characteristics of the respondents have a significant role in responding to the questions in any research study. This research explored and described in this section some personal characteristics which include gender, age, education level, and work experiences of the respondents.

4.1.1 Gender

Table 4.1 shows that the sample was dominated by the male as they were many as compared to women. Male was 106 composing 52.7% of the total sampled population while females were 95 making up 47.3% of the total population. There is a good distribution of gender as they don't deviate much apart (different of 5.4%). The researcher used a random sampling technique to make sure there was an even selection of respondents

Table 4. 1: Gender

		Frequency	Percent	Cumulative Percent
Gender	Male	106	52.7	52.7
	Female	95	47.3	100.0
	Total	201	100.0	

4.1.2 Age

The sample population was dominated by respondents with ages between 29-39 years as they made up 33.3% of the total sample population (table 4.2). It is followed by respondents with ages between 40-50 contributing to 29.4% of the sampled population, followed by those with ages between 18-28 and those with ages 51-61. There were only 2 respondents with age above 61 years as they were only 2 equivalent to 1% of the total respondents

Table 4. 2: Age

		Frequency	Percent	Cumulative Percent
Age	18-28	49	24.4	24.4
	29-39	67	33.3	57.7
	40-50	59	29.4	87.1
	51-61	24	11.9	99.0
	62 and above	2	1.0	100.0
	Total	201	100.0	

4.1.3 Education

From table 4.3, many respondents had a diploma which made up to 50.7% of the total number of respondents followed by those with a bachelor's degree (21.4%), then 17.9% had a certificate and 10% of the respondents had master's degree and above. This shows that the majority of the respondents are educated of at least bachelor and diploma but there was a good distribution of respondents as at least the researcher reached out to people of different levels of education

Table 4. 3: Education

		Frequency	Percent	Cumulative Percent
Education	Certificate	36	17.9	17.9
	Diploma	102	50.7	68.7
	bachelor degree	43	21.4	90.0
	master's degree and above	20	10.0	100.0
	Total	201	100.0	

4.1.4 Marital Status

The population selected by the researcher was characterized by many married respondents as shown in table 4.4. 55.7% of the respondents were married, 29.9% were single, 8.5% were divorced and 6% were widowed. This shows that the researcher wasn't biased as people with different marital statuses were involved in the study

Table 4. 4: Marital Status

		Frequency	Percent	Cumulative Percent
Marital status	Single	60	29.9	29.9
	Married	112	55.7	85.6
	Divorced	17	8.5	94.0
	Widowed	12	6.0	100.0
	Total	201	100.0	

4.1.5 Experience

From table 4.5, there was a good distribution of respondents by experience as the deviation was not much critical. Many respondents had experience of 10 years and above in their respective organizations. It was followed by those with 4-9 years in service. There were few respondents with less than 3 years of services

Table 4. 5: Experience

		Frequency	Percent	Cumulative Percent
Experience	0-3 years	32	15.9	15.9
	4-9 years	79	39.3	55.2
	10 years and above	90	44.8	100.0
	Total	201	100.0	

4.2 Effects of technological infrastructures on the adoption of E-Procurement

This specific objective was answered by five questions from respondents regarding challenges facing the adoption of e-procurement in the Tanzania public sector a case of the Arusha region. The responses are shown in table 4.6 Many respondents agreed that system-associated risks hinder the adoption of e-procurement in Tanzania as agreed by 87.6% of the total respondents. The table further shows that the respondents signified that system compatibility hinder adoption of e-procurement as shown by 64.2% percentage of acceptance, increase in cybercrimes is a challenge to the adoption of e-procurement in Tanzania shown by acceptance of 55.7%, the poor network is a setback to the adoption of e-procurement and unstable power supply hinder the adoption of e-procurement in Tanzania as agreed by 51.2% and 59.7% respectively.

Table 4. 6: Responses regarding technological infrastructures

Technological Infrastructures		Frequency	Percent	Cumulative Percent
System risks hinder the adoption of e-procurement	strongly agree	148	73.6	73.6
	Agree	28	13.9	87.6
	undecided	12	6.0	93.5
	disagree	6	3.0	96.5
	strongly disagree	7	3.5	100.0
	Total	201	100.0	
System compatibility hinder adoption of e-procurement	strongly agree	129	64.2	64.2
	Agree	41	20.4	84.6
	Undecided	14	7.0	91.5
	Disagree	10	5.0	96.5
	strongly disagree	7	3.5	100.0
	Total	201	100.0	
Increased cybercrimes is a setback to the adoption of e-procurement	strongly agree	58	28.9	28.9
	Agree	54	26.9	55.7
	undecided	69	34.3	90.0
	Disagree	13	6.5	96.5
	strongly disagree	7	3.5	100.0
	Total	201	100.0	
Poor network discourages e-procurement adoption	strongly agree	67	33.3	33.3
	Agree	36	17.9	51.2
	Undecided	56	27.9	79.1
	Disagree	29	14.4	93.5
	strongly disagree	13	6.5	100.0
	Total	201	100.0	
The unstable power supply is a challenge to e-procurement adoption	strongly agree	71	35.3	35.3
	Agree	49	24.4	59.7
	undecided	43	21.4	81.1
	Disagree	12	6.0	87.1
	strongly disagree	26	12.9	100.0

Total	201	100.0	

4.3 Regression Analysis

Regression analysis was conducted to show the overall relationship between the dependent variable (e-procurement adoption) and independent variables (technological infrastructures, legal compliance, and knowledge, and skills)

4.3.1 Significance of the Model

From table 4.7, the study performed linear regression analysis to explain the relationship between dependent and independent variables. The overall model was found to be significantly explained by the significance value of p. The model p-value is 0.000 which is less than the 5% significance level.

Table 4.7: F-statistics for Overall Significance of the Model

Model		Sum of Squares	F	p-value
1	Regression	90.150	212.454	0.000
	Residual	27.864		

From table 4.8, the model R^2 was found to be 0.764 equivalent to 76.4%. The value of R^2 shows how much the influence of the independent variables changes on the dependent variable. From the model **R^2,** changes in the adoption of e-procurement are influenced by legal compliance, knowledge and skills, and technological infrastructures by 76.4%. 33.6% of changes in the adoption of e-procurement is influenced by other factors not explained in the model

Table 4.8: The Model R^2

Model	R	R Square	Adjusted R Square
1	0.874	0.764	0.760

From table 4.9, technological infrastructure was found to be significant at 5% since its p-value was found to be less than 0.05 i.e. p-value=0.004. Change in technological infrastructures by 1% would result in a change in e-procurement adoption by 0.273%.

Table 4.9: Linear Regression Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.015	.093		0.166	0.868
	TI	0.273	0.094	0.263	2.898	0.004

$PA= \beta_0 + \beta_1 TI$

$PA=0.015+0.273TI$

Where,

PA-E-procurement adoption
TI-Technological infrastructures

4.4 Discussion of Findings

The study found that there is a significant positive relationship between the adoption of e-procurement and technological infrastructures. As technological infrastructures fall by 1% leads to a fall in the adoption of e-procurement models by 0.273%. Lack of system compatibility, increase in system risks, poor networking, and unstable power supply all hinder the adoption of e-procurement as they compose successful technological infrastructures.

Ogubala et al (2014) the technology infrastructure context represents the pool of technologies available to a firm for adoption. These can be both the technologies available on the market and the firms' current equipment. The most vital elements which influence the organization in Tanzania to adopt e-procurement are Technological infrastructures, Technological Complexity, and Technological Compatibility. Perceived. A better ICT Infrastructure enhances E-procurement development. Technological Complexity relates to the level of ease with which the E-procurement technology can be understood by the firms. Firms generally tend to adopt technologies that are in association with certain internal experiences and values, that is, technology that is consistent and within the limits of the firm and with those technologies that will become available in the future (Mshamu, 2013). Similar to a study carried out by Makoba et al., (2017).

5.0 Conclusion

From the study findings, it can be concluded that before adopting e-procurement the regional management should ensure that there are enough infrastructures to support the system as it was found that most e-procurement adoption fails due to inadequate availability of supporting infrastructures like strong network and internet, unstable power supply and increase in cybercrimes.

6.0 Recommendations

The government should make technological friendly for acceptance of any ICT framework to be adopted. There should be enough infrastructures to support e-procurement from physical infrastructures to intangible infrastructures and there is a need for the government to establish collages or short courses about e-procurement for people with lower education levels like those with certificates and diplomas levels. These will help employees to manage their business as they won't need higher experts in such areas

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