

Determinants for Adoption of Electronic Procurement Systems by Public Institutions: A Case of Tanzania Institute of Accountancy

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Abstract

This study focuses on evaluating the factors influencing the adoption of electronic procurement systems in Tanzanian procuring entities. Specifically, the research aimed to investigate the impact of organizational factors, technological infrastructure, and environmental issues on the adoption of e-procurement in public procuring entities. The study employed a case study research design, with the Tanzania Institute of Accountancy (TIA) head office as the selected study area. A purposive sample of 74 respondents was chosen from the population, and data was gathered using structured questionnaires. To analyze the relationships between the dependent and independent variables, the study utilized multiple regression and correlation analysis. The findings indicated a positive and significant correlation between organizational factors, technological infrastructure, and environmental issues in the adoption of e-procurement by public procuring entities. The study concludes that organizational factors, technological infrastructure, and environmental considerations are pivotal determinants for the adoption of e-procurement in public procuring entities. As a recommendation, the study suggests that the government, particularly through the Ministry of Finance, should enhance organizational factors by ensuring adequate resource allocation to facilitate the successful adoption of e-procurement practices.

Keywords: *Electronic Procurement Systems, Organizational factors, Technological Infrastructure and Environmental Issues.*

1.0 BACKGROUND

Globally, companies are increasingly focusing on electronic commerce technologies to enhance the effectiveness of their operational procedures (Maagi & Mwakalobo, 2023). The prevailing type of e-commerce system, particularly in the context of interactions between businesses, which has gained recent scholarly interest, is referred to as Electronic Procurement Systems (EPS) (Koech et al., 2016).

E-procurement streamlines an organization's procurement procedures, lowering transaction expenses, enhancing collaboration across the supply chain, strengthening partnerships with business associates, and presenting competitive sourcing prospects for buyers (Mabeifam et al., 2017). Alomar and Visscher (2017) have delineated substantial advantages linked to electronic procurement (e-procurement). These benefits encompass a reduction in supply chain expenses, lowering costs associated with the tendering process, time savings, streamlined ordering procedures, decreased paperwork, minimized duplication of efforts, a reduction in bureaucratic hurdles, standardization of both processes and documentation, the introduction of online reporting capabilities, heightened transparency in procurement processes, adherence to procurement regulations and laws, a decrease in errors, and enhanced accessibility to information.

Prior studies have also suggested that e-procurement can result in enhanced quality and more effective purchasing practices (Asare et al., 2017). Additionally, it has been observed that e-procurement facilitates the decentralization of procurement, allowing procurement professionals to allocate more attention to strategically significant matters (Abbas & Hassan, 2023).

Over the last decade, research efforts have delved into the implementation of e-procurement systems across various organizations, encompassing both private and public sectors (Yusoff et al., 2010). Nevertheless, there are limited studies within procurement literature about the adoption and utilization of e-procurement systems, particularly in developing nations, such as those in Sub-Saharan Africa (Nandankar and Sachan, 2020). Furthermore, prior research concerning the adoption and application of e-procurement systems, especially within developing nations like those in Sub-Saharan Africa, has been limited (Nandankar and Sachan, 2020).

According to Mchopa (2008), firms employing e-procurement technologies realize a 42% reduction in purchasing transaction expenses. This cost reduction is attributed to the streamlining of the purchasing process and the shorter

purchasing cycle, leading to improved flexibility and access to current information when making purchase orders. Consequently, e-procurement tends to enhance the negotiation capabilities of companies engaging with their preferred suppliers, resulting in decreased instances of uncontrolled or unauthorized purchasing.

The growing need for public procurement departments to optimize their operations and contribute greater value to the business is prompting procurement managers to seek innovative methods for enhancing the efficiency of their purchasing processes. Despite numerous studies demonstrating the significant positive effects of the e-procurement process on simplifying and streamlining procurement, a substantial number of companies continue to overlook the adoption of these technologies (Deus et al., 1970).

Previous studies from developing countries indicate that there is a limited body of research that investigates the influence of three key factors (technological, organizational, and environmental) on the adoption of e-procurement (Mohammed et al., 2016). Therefore, the current study aimed to fill the gap by assessing the determinants for the adoption of electronic procurement systems by Tanzanian procuring entities.

The current procurement system in Tanzania continues to involve a substantial degree of human interference at various points throughout the procurement process (Siwandeti et al., 2023). The traditional procurement approach has introduced inefficiencies across various phases of the procurement cycle, leading to significant delays in project implementation. Despite the government's initiatives to enhance transparency in the procurement process, there is a noticeable increase in the time required for procurement, accompanied by a perception of heightened corruption levels. Transitioning procurement to the electronic sphere is seen as a means to improve and simplify the procurement process (Panya&Awuor, 2023).

Moreover, the few studies on the aspect of e-procurement in the Tanzanian context have resulted in the government being very late in the adoption of Electronic Procurement Systems (EPS) and the subsequent benefits they could bring to the public sector. The challenges related to the applicability of technological, organizational, and environmental factors in facilitating the adoption process have also been a significant hurdle for many Public Procurement Entities (PPEs) in Tanzania, which play a pivotal role in delivering social services to the citizens. An examination of existing literature from developing countries has revealed a notable scarcity of empirical research focusing on the primary drivers (technological, organizational, and

environmental) that influence the adoption of e-procurement. Therefore, this research aims to bridge this gap by concentrating on the factors influencing the adoption of e-procurement in Tanzania (Panya & Wuor, 2023).

This study concentrates on determining the factors that affect public procuring entities in the adoption of EPS when performing procurement processes and other requirements. Many PMU members have been escaping EPS in the procurement process and that has led to the longest process of acquiring organizational requirements causing purchase expenses to be higher. All these issues have influenced the researcher to identify the factors of all types and give some recommendations as needed.

2.0 LITERATURE REVIEW, CONCEPTUAL FRAMEWORK, AND HYPOTHESIS STATEMENTS

2.1 Theoretical Framework

Several theories explain how Information and Communication Technology can diffuse and adapt to the community after its innovation. For PPEs to adopt and use EPS at least, they need to pass through and understand thoroughly how technology as innovation can diffuse to the community. This study was guided by two theories of technology adoption, which are the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (DOI).

Technology Acceptance Model (TAM)

This study employed TAM to explain e-procurement usage behavior and identify causes of potential adopters to accept or reject e-procurement as proposed by previous studies such as Bagozzi (2007); and Suleiman (2015). Theoretically, TAM (Technology Acceptance Model) is rooted in the Theory of Reasoned Action (TRA) as developed by Ajzen in 1991, and TRA is quite broad in scope. In TAM, there are two core theoretical elements: perceived usefulness and perceived ease of use. These elements serve as the foundational factors that determine whether a system will be used and also predict the user's attitude towards using the system, which essentially reflects their willingness to utilize it. Perceived usefulness refers to how much a person believes that using a specific system will improve their job performance, while perceived ease of use relates to how much effort a person thinks they will need to put in when using that particular system (Bagozzi, 2007). Within the realm of education, both educators and students have extensively applied the TAM model to assess the adoption of instructional technology. Research findings have indicated that the TAM model can effectively account for approximately 50% of the variations in acceptance levels (Bagozzi, 2007).

This study examined the two constructs in Tanzanian public procuring entities towards the adoption and usage of EPS. TAM also takes into account the idea that external factors, such as system attributes like design quality, training, documentation, and the characteristics of decision-makers, could have an impact on the adoption and utilization of technology (Wahid, 2007).

Diffusion of Innovation Theory (DOI)

The second theory that the researcher used to guide his study is the Diffusion of Innovation Theory (DOI), which is a significant concept in the realm of adoption, and one of its prominent proponents is Everett M. Rogers, who has formulated a comprehensive framework outlining the diffusion of innovation. Essentially, diffusion refers to the process by which a new idea is communicated through specific channels over time among members of a social system (Rogers et al., 2019). This communication process is unique because it revolves around the dissemination of a novel concept, which inherently carries some degree of uncertainty. When new ideas are created, disseminated, and either embraced or rejected, they give rise to certain outcomes, including social change. Although many innovators assume that a superior innovation will naturally gain acceptance, this is frequently not the case. In reality, most innovations tend to spread relatively slowly or may not reach a user base at all.

2.2 Empirical Evidence

The concept of Electronic Procurement Systems (EPS) has attracted various researchers to write and educate the community. The notion of electronic and procurement software adoption attracts a number of researchers to study on the matter (Shatta et al., 2020). Most of the studies have highlighted the advantages of EPS. Some have just ended up praising EPS by discussing opportunities offered by it and giving comparisons over traditional procurement systems.

The study by Rasto and Kenyatta (2017) investigated how the implementation of electronic procurement practices affects the performance of public hospitals within the UasinGishu County government in Kenya. The study utilized the Diffusion of Innovation Theory and Institutional Theory as its theoretical frameworks. It conducted a descriptive survey involving five hospitals, with a sample size of 367 respondents. The primary data collection method was the use of questionnaires. Data collected was then organized, coded, and entered into Statistical Package for Social Sciences (SPSS) Version 22. The research incorporated both quantitative and qualitative data. The findings indicated that in terms of e-tendering, there is an observed increase in competitiveness in the hospital's bidding processes. This suggests that the implementation of electronic

procurement in hospitals helped to improve procurement systems, allowing both individuals and hospitals to bid for tenders that align with their qualifications and professional backgrounds.

Moreover, Mushi (2018) investigated factors that influence the adoption of electronic procurement within organizations, making a comparative analysis between private and public organizations. The study found that there are positive and significant relationships between individual-related factors and organizational-related factors in influencing the adoption of electronic procurement.

The study by Bhaukaurally and Ramesh, (2017) aimed to evaluate the obstacles and advantages associated with the implementation of e-procurement. Secondary data was gathered from certain organizations, while primary data was obtained through a research survey involving questionnaires distributed to supply chain officers and suppliers. The findings indicate that the adoption of e-procurement is not widespread, primarily due to external hurdles such as technological limitations, infrastructure inadequacies, legislative issues, and environmental factors. Additionally, resource constraints and organizational characteristics were identified as two distinct categories of internal obstacles that hinder the adoption of e-procurement. Addressing these barriers would necessitate collaborative efforts from various stakeholders, including government entities, system developers, suppliers, employees, and procurement personnel.

Another study by Daoud and Ibrahim (2018) examined factors that influence the utilization of e-procurement, with a specific focus on the moderating influence of power. The results unveiled that top management possesses a deeper understanding of the factors that promote the adoption of e-procurement. Additionally, the findings from this research empower top management to more effectively manage the effects of other contributing factors.

Adebayo and Evans, (2016), aimed to assess the adoption of e-procurement systems in developing countries: a Nigerian public sector perspective. The study emphasized that the most crucial factor is that the implementation of e-procurement enhances transparency in the procurement process. Secondly, it highlighted that e-procurement implementation contributes significantly to improving the integrity of the procurement process. Thirdly, the study underscored that one of the most important aspects of e-procurement implementation is its role in reducing corruption. Furthermore, a study by Koech et al. (2016) explored the factors influencing the adoption of e-procurement in Kenya's public sector. This research identified that the enforceability and legality

of electronic contracts play a pivotal role in determining the adoption of e-procurement. Practitioners are concerned about whether these electronic contracts can be enforced in the event of a legal dispute. Additionally, the study emphasized the significance of addressing issues related to resistance to change and the role of leadership, as these are cultural factors that are paramount in driving the adoption of e-procurement.

In Tanzania, the study by Shatta et al., (2020) aimed to investigate the factors that influence the adoption of the E-Procurement Adoption Model for Green Procurement in Developing Countries. The research suggests that enhancing the adoption of TANePS (presumably an e-procurement system) and ensuring its successful implementation across all procuring entities in the country is advisable.

2.3 Synthesis of the Research Gap

Empirical evidence shows that most of the literature has tried to explain general knowledge about Electronic Procurement Systems. Literature has pinpointed the benefits of using Electronic Procurement Systems compared to traditional methods and these benefits are quite open. Apart from all the advantages explained by the literature for years, there are few studies on the aspect of e-procurement in Tanzanian.

2.4 Conceptual Framework and Hypothesis Statements

The study assumes that the dependent variable of the study is the adoption of EPS in public procuring entities. Thus, the adoption of EPS depends on three independent variables namely; organizational factors, technological factors, and environmental factors.

Also, the study assumes that organizational factors affect the adoption of EPS through top management support, IT experience and skills, employees' encouragement, top management awareness, and resource allocation.

Moreover, technological factors affect the adoption of EPS through the availability of adequate computers, ease of use, existing infrastructures, and technological support. Furthermore, the study assumes that environmental factors affect the adoption of EPS through network reliability, ICT laws, regulatory bodies, and e-procurement opportunities.

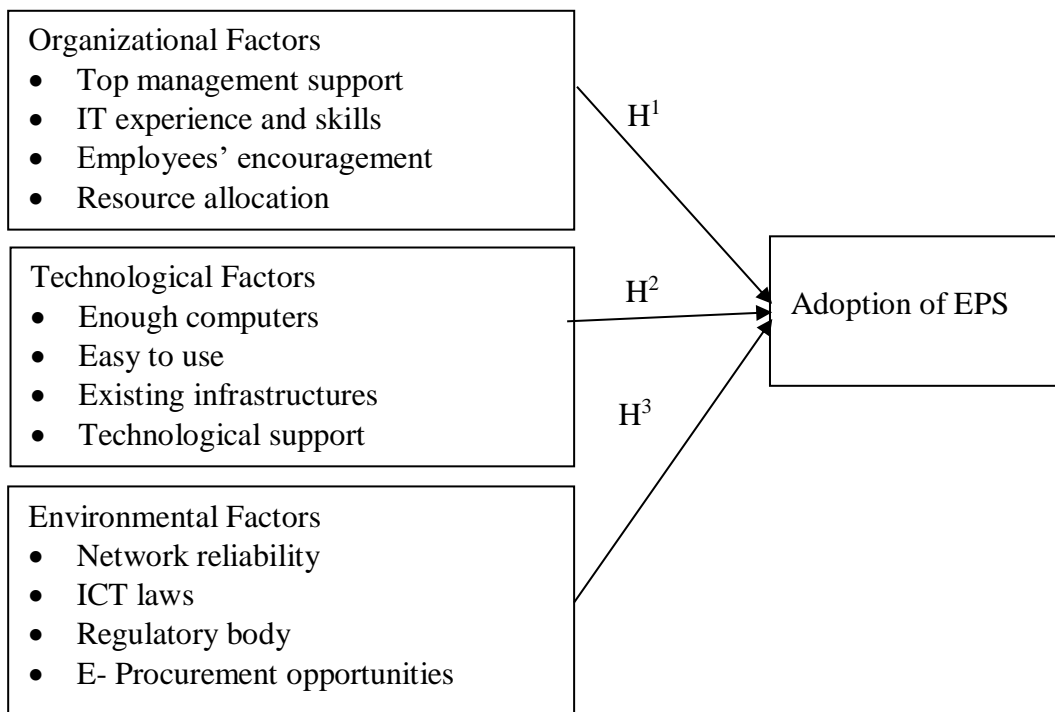


Figure 1: Conceptual Framework

Source: Researcher,2021

Hypothesis Statements

This study was guided by the following hypothesis statements

H1: Organizational factors have a positive effect on the adoption of EPS in Tanzanian public procuring entities

H2: Technological factors have a positive effect on the adoption of EPS in Tanzanian public procuring entities

H3: Environmental factors have a positive effect on the adoption of EPS in Tanzanian public procuring entities

3.0 RESEARCH METHODOLOGY

3.1 Study Area

The study was conducted at the Tanzania Institute of Accountancy (TIA) head office in Dar es Salaam. TIA is an institution of higher learning (IHL) accredited by the National Accreditation Council for Technical Education (NACTE) in Tanzania. TIA was selected because it is one of the PPEs in Tanzania where the adoption and usage of EPS are expected to be in a high degree to reduce the cost of public procurement.

3.2 Research Design

This study employed a case study research design. Hair et al., (2016) described a case study research design as an in-depth investigation of an individual, group, institution, or phenomenon. The study used a case study to gain an in-depth knowledge of the factors affecting the adoption of electronic procurement systems as suggested by Ronald and Omwenga (2015). The major purpose of a case study research design is to determine factors and relationships among the factors that have resulted in the behaviour under study (Hair et al., 2016). Since this study intended to assess factors affecting the adoption of electronic procurement systems, a case study design is deemed the best design to realize the purpose of the study.

3.3 Research Approach

This study used a qualitative research approach to test the hypothesis. This approach was used because the study intended to show the effects of organizational factors, technological infrastructural factors, and environmental issues on the adoption of e-procurement for public procuring entities. According to Hair et al., (2010) qualitative approach is preferred for establishing the link between independent and dependent variables. Therefore, a qualitative approach was used in this study to test the hypothesis.

3.4 Population, Sample Size, and Sampling Techniques

Target Population

The targeted population of the study involved employees and trained bidders from TIA. The organization has 242 employees and 50 Trained Bidders who have undergone training on how to use EPS. The target population comprised the Rector-Accounting officer, Deputy Rector-Academic Research and Consultancy,

Deputy Rector-Administration and Finance, Heads of departments, Systems administrators, Tender board members, PMU members, Trained bidders, User Department, Campus Managers and Procurement Lecturers, as presented in Table 1.

Sample Size

Hair et al., (2010) argue that determining the appropriate sample size should take into account the specific data analysis methods employed. Given that this study utilizes both descriptive and multiple regression analyses, the recommended approach to calculate the sample size is under the formula proposed by Daoud and Ibrahim (2018).

$$n = \frac{N}{1 + N(e)^2} \quad n = \frac{242}{1 + 242(10\%)^2} \quad n = 74$$

Whereby:

n = estimated sample size

m = sample population

e= precision

Therefore, the sample size of the study was 74 respondents. Table 1 shows population and sample distribution.

Table 1: Population and Sample Distribution

S/N	Occupation/Position	Population	Sample Size
1.	Rector-Accounting officer	1	1
2.	Deputy Rectors	2	1
3.	Campus Managers	6	5
4.	Heads of departments +Coordinators	21	6
5.	Systems Administrators	8	5
6.	Tender board members	8	7
7	PMU Members	22	22
8	Trained Bidders on EPS	50	15
9	User Department	150	6
10	PMU Lecturers	24	6
TOTAL		292	74

Source: Researcher, 2021.

Sampling Techniques

Sampling involves the careful selection of sample elements to ensure that it accurately represent the larger population (Hair et al., 2010). In this study, a purposive sampling technique was employed to choose respondents within the

study area, a method previously endorsed by scholars like Ronald and Omwenga (2015); and So and Sun (2010).

Purposive sampling relies on the researcher's informed judgment, aiming to gather data from the selected sample that is deemed reliable and pertinent to the research objectives. As Hair et al. (2010) explain, purposive sampling helps the researcher to select cases that, in their estimation, provide information aligning with the research goals. In this study, purposive sampling was chosen because it allows the researcher to engage with respondents who possess adequate knowledge about electronic procurement systems.

3.5 Data Collection Methods

For this study, primary data was collected mainly through questionnaires. Also, secondary data was collected from existing credible sources through documentary review.

Questionnaires

In this study, structured questionnaires were employed as a primary data collection method to gather information about respondent profiles, organizational factors, technological infrastructure, environmental issues, and the adoption of e-procurement. This approach was chosen in alignment with the recommendations of Asare et al. (2017). It was deemed suitable for gathering data from a large sample, as suggested by Downs (1990). Additionally, using questionnaires allows for the quantification of collected data, which is essential for the intended regression analysis in this study. To enhance the validity of the data, constant follow-ups were conducted with respondents who had not returned their questionnaires. The questionnaires were also piloted to identify and correct any misinterpretations.

Documentary Review

To obtain secondary data related to organizational factors, technological infrastructure, environmental issues, and the adoption of e-procurement, this study employed documentary analysis. This method was chosen based on the recommendations of Adebayo and David Evans (2016). Documentary review served as a valuable means of collecting supplementary data to augment the primary data and enhance the reliability of the study's findings.

3.6 Measurement of the Variables

The measurement for the constructs of interest was based on established scales from previous research, proven to be psychometrically sound (So and Sun, 2010; Hair et al., 2010; and Ronald and Omwenga, 2015).

Organizational factor was measured by using five constructs (top management support, IT experience and skills, employees' encouragement, top management awareness, and resource allocation) as suggested by previous studies such as Suleiman 2015; Tsuma and Kanda, 2017; and Nandankar and Sachan (2020).

Technological factors were measured through the presence of enough computers, ease of use, existing infrastructures, and technological support as proposed by earlier studies such as Mohammed 2013; and Suleiman (2015).

Also, the study measures environmental factors by using four constructs namely; network reliability, ICT laws, regulatory body, and e-procurement opportunities as proposed by previous studies such as Suleiman 2015; and Tsuma and Kanda (2017).

Moreover, the adoption of electronic procurement systems was measured through reduced paperwork, reduced errors, fairness and transparency, and standardized procurement procedures as suggested by Suleiman 2015; and Tsuma and Kanda (2017).

3.7 Data Analysis Methods

The research employed both descriptive and multiple regression analyses for data analysis purposes. Descriptive analysis was applied to provide an overview of respondent profiles, organizational factors, technological infrastructure, and environmental issues influencing the adoption of e-procurement, as recommended by Asare et al. (2017) and Koech et al. (2016). This involved presenting data through frequency tables and graphs, facilitated by the use of the Statistical Package for Social Sciences (SPSS).

Furthermore, the study utilized multiple regression analysis to assess the impact of organizational factors, technological infrastructure, and environmental considerations on the adoption of e-procurement. The decision to use multiple regression analysis was supported by previous research findings, including studies by Mabeifam et al. (2017), Daoud and Ibrahim (2018), and Mazengo and Mwaifyusi (2021). This analytical approach aimed to establish the factors that influence the adoption of electronic procurement systems among Tanzanian procuring entities. Consequently, the study employed a multiple regression equation for this purpose.

$$Aeps = f(Of, Tic, Ei) \dots \dots \dots (i)$$

Where:

Aeps = Adoption of Electronic Procurement Systems,

Of= Organizational factors

Tic= Technological infrastructural factors

Ei = Environmental issues

The regression equation (i) can be presented in the following empirical equation

$$Aeps = \beta_0 + \beta_1 Of + \beta_2 Tic + \beta_3 Ei + \epsilon_i \dots \dots \dots (ii)$$

4.0 FINDINGS AND DISCUSSION

4.1 Diagnostic Tests

This study employed multiple regression to establish the relationship between organizational factors, technological infrastructural factors, and environmental issues on the adoption of e-procurement for public procuring entities. Therefore, various assumptions of multiple regression were tested.

Autocorrelation: This study used the Durbin-Watson test to test for the existence of autocorrelation. The results in Table 2 show that there is no statistically significant autocorrelation in this study.

Table 2: Model Summary for Durbin-Watson

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.816 ^a	.667	.559	0.00742	1.951

a. Predictors: (Constant), Organizational factors, Technological Infrastructural factors and Environmental Issues

b. Dependent Variable: Adoption of e-procurement system

Normality Test: Data were tested for normality using Kolmogorov Smirnov and Shapiro–Wilk statistics whose findings are reported in Table 3. All values for dependent and independent variables are higher than 0.05 implying the normality assumption was met (Hair et al., 2017).

Table 3: Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
E-procurement system	.153	71	.072	.992	71	.003

Organizational factors	.159	71	.083	.991	71	.001
Technological Infrastructural	.270	71	.217	.979	71	.000
Environmental Issues	.269	71	.163	.989	71	.000

a. Lilliefors Significance Correction

Multicollinearity: One of the assumptions of the linear regression model is the absence of multicollinearity among predictor variables included in the model. Existence of multicollinearity is a serious problem in regression analysis. This can be detected by three different techniques namely, (1) a bivariate correlation analysis among predictor variables (2) calculation of Variance Inflation Factor (VIF) and (3) inspection of the Eigen system of the independent variables. In this study, VIF was used whose results are presented in Table 4 below.

Table 4: Tests of Multicollinearity

Model	Collinearity Statistics		
	Tolerance	VIF	
1	Organizational factors	.638	1.567
	Technological Infrastructural	.739	1.354
	Environmental Issues	.779	1.283

a. Dependent Variable: Adoption of e-procurement system

The threshold given by Wahid (2007); and Mmasi & Mwaifyusi (2021) is that the tolerance values of less than 0.2 and VIF values indicate multicollinearity is at work. Clearly, the results in Table 4 show that multicollinearity was not a problem in the current study.

Test for Linearity Assumption: The Linearity assumption test was carried out using a Normal p-p plot. This was followed by a correlation analysis between the adoption of the e-procurement system and organizational factors ($r = 0.758$, $p < 0.01$), and technological infrastructural ($r = 0.629$, $p < 0.01$), and environmental issues ($r = 0.774$, $p < 0.01$). The results confirmed the linearity assumption has not been violated.

Validity and Reliability Test

Content Validity was ensured through a comprehensive literature review regarding organizational factors, technological infrastructural factors, environmental issues, and adoption of e-procurement as suggested by Daoud and

Ibrahim (2018); and Mwaifyusi & Dau (2022). Moreover, the variables were derived from the theory to adhere to content validity.

Construct Validity was achieved by examining the correlation coefficient among the variables making organizational factors, technological infrastructural factors, and environmental issues scales as recommended by Daoud and Ibrahim (2018). The construct has two main elements namely, convergent validity and discriminant validity (Hair et al., 2017).

Convergent Validity was measured by using factor loadings through Confirmatory Factor Analysis - CFA (Downs, 1990). Table 5 shows that factor loadings for all variables are greater than 0.5, thereby passing the threshold set by Hair et al., (2017). Moreover, the correlation between the three constructs namely organizational factors, technological infrastructural factors and environmental issues ranges from 0.79 to 0.89 (Significance < 0.01). This strong correlation between the three constructs is a further confirmation of the presence of convergent validity (Downs, 1990).

Discriminant Validity was examined by using Average Variance Extracted (AVE). Downs (1990) proposed that to achieve discriminant validity, AVE values should be greater than the squared correlation coefficient. The results of this study show that all AVE values are greater than the squared correlation coefficient.

Reliability Test was conducted by using Cronbach alpha which is a commonly used measure of reliability. A Cronbach alpha value of higher than 0.7 indicates the internal consistency of the measures employed (Hair et al., 2017). The results in Table 5 show that the alpha values for all independent variables are higher than the threshold.

Results from Factor Analysis

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of sphericity must be conducted in order to establish the fitness of the data for factor analysis (Hair et al., 2017). The results in Table 5 show the KMO value is 0.746 which suggests that the data was fit for CFA (Kaiser 1974). In addition, the results of Bartlett's test for sphericity was highly significant ($p \leq 0.001$); giving more credence for using factor analysis.

Table 5: Factor Analysis

Indicators	Loading	Cronbach's α	AVE
Organizational Factors		.892	.789
.584			
IT experience and skills Employees	.576		
Encouragement	.602		
Top management awareness	.569		
Resources allocation	.547		
Technological Factors		.875	.712
Enough computers			
Enough computers	.730		
Ease of use	.699		
Existing infrastructures	.712		
Technological support	.635		
Environmental factors		.826	.831
Network reliability			
Network reliability	.692		
ICT laws	.674		
Regulatory body	.735		
E-procurement opportunities	.680		
Adoption of e-procurement system		.781	.769
Reduce paperwork			
Reduce paperwork	.571		
Reduce errors			
Reduce errors	.636		
Increased Fairness and Transparency			
Increased Fairness and Transparency	.544		
Standardise Procurement Procedures			
Standardise Procurement Procedures	.691		
Eigenvalues = 2.664			
Variance (%) = 4.131			
Cumulative variance			
(%) : 66.2			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.746
Approx. Chi-square		7331.371	
Bartlett's Test of Sphericitydf		71	
Sig.		.000	

4.1 Descriptive Statistics

The findings in Table 6 present the descriptive analysis results of the variables of the study. The dependent variable of the study is adoption of e-procurement system, while the independent variables are organizational factors, technological infrastructural and environmental issues.

Table 6: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Organizational factors	71	.00	.90	.4333	.19222
Technological Infrastructural	71	.12	.75	.3934	.14890
Environmental Issues	71	.20	.93	.5793	.16199
Adoption of e- procurement system	71	.17	.79	.4707	.15662
Valid N (list-wise)	71				

The findings in Table 6 show the average adoption of the e-procurement system. The result illustrates that the average change in adoption of the e-procurement system was 0.4707 with a standard deviation of 0.15662. The mean number of organizational factor was 0.4333 with a standard deviation of 0.19222. The average mean of a technological infrastructural factor was 0.3934 with a standard deviation of 0.14890. Moreover, the average mean of environmental factor stood at 0.5793 with a standard deviation of 0.16199.

4.2 Findings from Multiple Regression

Multiple regression was used to examine the ability of the three independent variables namely, organizational factors, technological infrastructural, and environmental issues to predict the adoption of e-Procurement Systems to Tanzanian PEs.

Table 7: Regression Analysis

Variable	B	SE (b)	B	T	P
Constant	19.412			7.131	.003
Organizational factors	.705	.149	.312	3.197	.001
Technological Infrastructural	.640	.125	.376	3.502	.000
Environmental Issues	.818	.228	.305	3.049	.000

$R^2 = .667\%$, F-statistic=189.187,

Results in Table 7 show a coefficient of determination (R^2) of 0.667, with an F-statistic of 189.187 (p-value = 0.000) which is significant at the 1% level (p < 0.01). This implies that 66.7% of the adoption of e-procurement in public institutions is explained by organizational factors, technological infrastructural and environmental issues.

4.3 Discussion of the Findings

Results in Table 7 show a coefficient of determination (R^2) of 0.667, with an F-statistic of 189.187 (p-value = 0.000) which is significant at the 1% level ($p < 0.01$). This implies that 66.7% of the adoption of e-procurement in public institutions is explained by organizational factors, technological infrastructural, and environmental issues. These results are consistent with previous studies by Daoud and Ibrahim (2018); Carolyne (2016) and Kinoti (2013).

4.3.1 Organizational Factors

The findings show that there is a positive and significant relationship between organizational factors and the adoption of e-procurement in public institutions (beta value 0.705, $t=3.197$, $p=0.001$). The findings imply that improvement in organizational factors may help to foster the full adoption of e-procurement in public institutions. This is consistent with the study by Adebayo and David (2016), which asserts that the organization factor is one of the most influential factors of e-procurement adoption. According to Daoud and Ibrahim (2018), three major arguments support the positive role of organizational factors in determining e-procurement adoption.

4.3.2 Technological Infrastructural Factors

The study found that there is a positive and significant relationship between technological infrastructural factors and the adoption of e-procurement in public institutions (beta value 0.640, $t=3.502$, $p=0.000$). The findings imply that improvement in technological infrastructural factors may contribute to the full adoption of e-procurement in public institutions. This relates to the study by Suleiman (2015), which suggests that the presence of good technological infrastructural factors is an important determinant for the effective adoption of e-procurement.

4.3.3 Environmental Factors

The results show that the environmental factor is the single most important factor in explaining the adoption of e-procurement in public institutions (beta value .818, $t=3.049$, $p=0.000$). These results are surprising partly because they are at variance with previous studies by Bhaukaurally and Ramesh (2017); and Alomar and Visscher (2017), but also because they defy logic. Conventional wisdom would suggest technological infrastructural factors should have been the most important factors to account for adoption of e-procurement because they are difficult or at least take a long time to imitate.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

This study concludes that organizational factors, technological infrastructural factors, and environmental issues are the main factors for the adoption of e-procurement for public procuring entities. These have positive and significant effects on the adoption of e-procurement for public procuring entities.

Also, the study concludes that organizational factors are necessary for the full adoption of e-procurement for public procuring entities. Indicators such as top management support, IT experience, and skills, employees' encouragement, top management awareness, and resource allocation are important factors for the full adoption of e-procurement for public procuring entities.

Moreover, the study concludes that technological factors such as the presence of enough computers, existing infrastructures, and technological support are important components of the full adoption of e-procurement for public procuring entities.

Furthermore, the study concludes that environmental factors involving network reliability, ICT laws, regulatory bodies, and e-procurement opportunities are necessary for the full adoption of e-procurement for public procuring entities.

5.2 Recommendations

The study proposes the following recommendations:

The study recommends that the government through the Ministry of Finance should improve organizational factors through adequate allocation of resources. Also, public institutions should ensure there is top management awareness, IT experience and skills, and employee encouragement in public institutions in order to foster the adoption of e-procurement for public procuring entities.

Also, public institutions should make an effort to ensure there enough computers in each department. Also, institutions should put emphasis on training in relation to computer use as this will facilitate the adoption of e-procurement for public procuring entities.

The public institutions should improve the existing ICT infrastructures; also technical support should be provided for effective adoption of e-procurement for public procuring entities. Moreover, public institutions should improve the legal infrastructure to reduce crime through e-transactions. This is necessary for full adoption of e-procurement for public procuring entities.

5.3 Implication of the Study

Addressing the research objectives offers several valuable contributions in terms of advancing the theoretical comprehension of the factors influencing the adoption of electronic procurement systems by Tanzanian procuring entities. The most significant contribution lies in elucidating the connections between organizational factors, technological infrastructure, environmental considerations, and the adoption of e-procurement within public procuring entities.

From a theoretical perspective, the findings of this study have expanded our understanding of the factors that impact the adoption of electronic procurement systems by Tanzanian procuring entities. This expanded knowledge will prove valuable for guiding future research endeavours.

Furthermore, in the realm of practical implications, the empirical results from this study furnish substantial and credible evidence that there is a positive and significant relationship between organizational factors, technological infrastructural factors, and environmental issues on the adoption of e-procurement. Thus, management should work hard to improve organizational factors, technological infrastructural factors, and environmental issues.

As far as the policy implication is approached, the study findings revealed that organizational factors, technological infrastructural factors, and environmental issues are the main factors for the adoption of e-procurement for public procuring entities. Therefore, it is necessary to develop and implement policies that can improve organizational factors, technological infrastructural factors, and environmental issues in order to facilitate the adoption of e-procurement for public procuring entities.

5.4 Areas for Further Studies

Future research in this field should explore and evaluate additional factors that were not addressed in this study. Subsequent investigations could delve into variables like government policies and economic influences.

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