The Influence of the National E-Procurement System on Employees' Performance in Selected Public Institutions in Tanzania

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Abstract
This study evaluates how the Tanzania National E-Procurement System (TANePS) affects worker productivity in a country's public institutions. The Government Procurement Services Agency (GPSA) and the Public Procurement Regulatory Authority (PPRA) were the two organizations where the study specifically investigated the adoption of TANePS and its impact on employee performance. With 200 employees from the chosen institutions participating in the sttudy's self-administered questionnaire survey, 66 percent of the respondents responded. According to the study, 84% of the respondents frequently used TANePS for e-tendering and e-payment, but only a small percentage utilized it for user registration and e-contract administration. While internal resistance negatively impacted management policies and system adoption, good software design and IT readiness promoted TANePS deployment. The introduction of TANePS was successful due to supportive policies and IT, increased performance, and enhanced procurement efficiency.

Keywords: *E-Procurement System, Tanzanian National e-Procurement System, Government Procurement Services Agency, technology implementation, readiness*

INTRODUCTION
The development of Information and Communication Technology (ICT) has resulted in numerous technological breakthroughs that have turned the wheel. Every industry has experienced a paradigm shift recently.

Governments and private organizations worldwide are struggling to provide electronic services. Procurement is a common activity undertaken by both private and public organizations. This entails buying and selling goods and services to and from customers. This activity has been conducted manually for many years (Motaung & Sifolo, 2023). The advancement of ICT has extended to the procurement sector and e-procurement has come into being. E-procurement has numerous advantages such as simplifying the procurement process, shortening the time spent in the tendering processes, and reducing the costs involved in tendering standardized commodities and services that can be specified and evaluated in terms of price (Chan & Owusu, 2022). Other institutions prefer the online tendering process because it reduces barriers to entry. Participants can submit an offer in the absence of a physical presence (Alke & Hassel, 2023; Asare & Prempeh, 2017).

The European Union, through its Pan European Public Procurement Online (PEPPOL) project has made notable contributions to the usage of e-procurement across the globe (Pedersen, Thomassen, Hoddevik, & Ciciriello, 2012; van Donge, Bharosa, & Janssen, 2022). This union has resulted in the adoption and advancement of public e-procurement systems in various countries including Chile, Guatemala, India, Italy, Panama, the Philippines, Romania, South Korea, and Thailand (Bulut & Yen, 2013). Considering the success of e-procurement systems in these areas, international organizations, such as the World Bank, Asia Pacific Economic Cooperation (APEC), Asian Development Bank (ADB), Inter-American Development Bank (IDB), and African Development Bank (ADB), have begun to encourage developing countries to adopt and implement e-procurement systems. These Organizations offer financial and technological assistance and guidance to countries that desire to adopt e-procurement systems (IEG, 2014; Pedersen et al., 2012).

Since the enactment of the Public Procurement Act (PPA) in 2001, Tanzania has seen an increased use of e-procurement (Ernest, 2022; Mwangosi, 2021). Establishing the Tanzania National e-Procurement System (TANePS) in June 2018 was a long-awaited effort to improve the system. TANEPS is a fully fledged e-procurement system that supports the entire public procurement cycle in Tanzania, from planning, user registration, e-tendering, and e-payments, to e-contract management. It is based on Tanzanian public procurement laws, particularly Part XI of the Government Notice (GN) No. 446, which provides regulations governing

procedures for electronic procurement in Tanzania (Shatta, Shayo, & Layaa, 2020). Many studies have examined the general factors that influence e-procurement, with most focusing on developed countries (Afolabi et al., 2022; Ernest, 2022; Mwangosi, 2021; Shatta, Shayo, Mchopa, & Layaa, 2020). In Tanzania, research indicates that the adoption of the e-procurement process is influenced by many factors, including the organization's size, top management attitudes and support characteristics, relative advantage characteristics, and user involvement characteristics (Shatta, Shayo, & Layaa, 2020). Consequently, other studies have found that the legal framework, employee competency, technological infrastructure, and security of data are challenges in e-procurement implementation in the public sector (Hamma-adama & Ahmad, 2021; Rowell et al., 2023; Wahsh & Dhillon, 2006).

According to Maepa et al. (2023), organizations can be ready to embark on e-procurement if they have existing in-house IT infrastructure, expertise, management willingness, and skills. Despite these studies on the adoption of e-procurement, there is limited evidence of the influence of e-procurement on employment performance. Therefore, this study assessed the adoption and influence of TANePS on employee performance at the following institutions in Tanzania: Government Procurement Services Agency (GPSA) and Public Procurement Regulatory Authority (PPRA).

Theoretical Framework

The study utilizes the technological diffusion theory to analyze the implementation of the Tanzanian National e-Procurement System (TANePS) and the performance of public-sector officials. This theory highlights the significance of technology adoption based on its ease of use and effectiveness in influencing the decision-making processes of organizations. The performance of employees is essential for the success of an organization, as growth in productivity contributes to economic stability and societal well-being. The model created by Padhi and Mohapatra (2010) is employed to assess the implementation of TANePS, focusing on the role of user-friendly software design, IT readiness, and management policies in reducing internal resistance and facilitating the adoption of technology. Ultimately, the adoption of e-procurement is anticipated to enhance procurement efficiency and reduce flaws, demonstrating the interconnection between technology adoption and organizational performance.

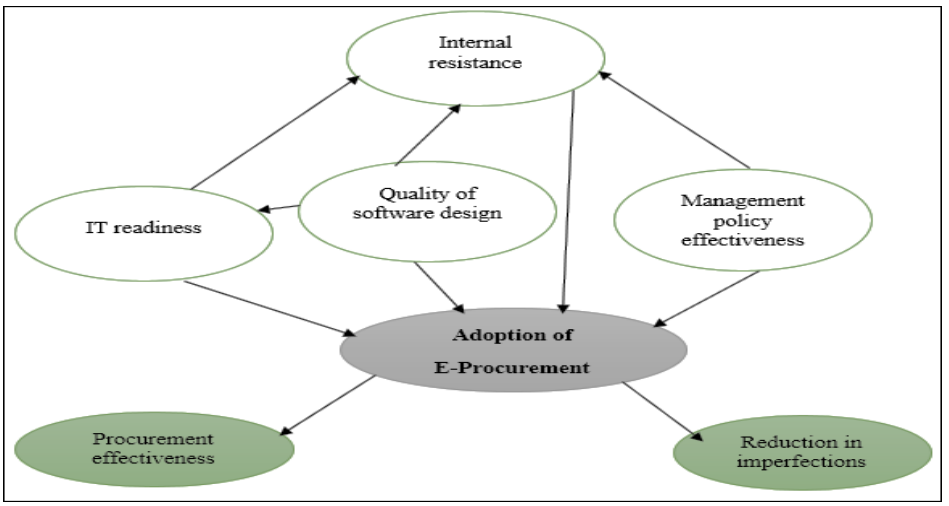

Figure 1: Research model adapted from Padhi and Mohapatra, (2010)

METHODOLOGY

The research utilized a case study design approach, gathering information from the GPSA and PPRA by means of a questionnaire survey administered to 200 employees from different departments. A five-point Likert scale was used to assess four independent variables: internal resistance (IR), quality of software design (QSD), IT readiness (IT-R), and management policy effectiveness (MPE). Measurement items for each variable were obtained from Padhi and Mohapatra (2010) to ensure a comprehensive evaluation. The research incorporated Likert scales and multiple-choice questions to evaluate the dependent variables, which included the adoption of TANePS, reduction in imperfections, and procurement effectiveness. To ensure the reliability of the data, the questionnaire was reviewed by senior researchers and underwent reliability tests using Cronbach's alpha. To validate the data, Exploratory Factor Analysis (EFA) was utilized to simplify the data and examine underlying theoretical structures, while Confirmatory Factor Analysis (CFA) was conducted to assess the validity of the measurement model. Descriptive and inferential statistics were employed for data analysis, and the measurement model demonstrated a reasonable fit to the data. The research established convergent and discriminant validity, with values surpassing established thresholds. Overall, the methodology employed rigorous procedures to guarantee the reliability and validity of the research's findings (Hair Jr., Gabriel, & Patel, 2014).

Table 1: The measurement model

Model fitting parameters	Recommended value	Model result
Chi-square ($\chi 2$)		714.48*
Degree of freedom (DF)		186
Chi-square ($\chi 2$)/df	≤ 3.00	3.841
Goodness of fit index (GFI)	≥ 0.90	0.945
Normalized fit index (NFI)	≥ 0.90	0.906
Root mean square error of approximation (RMSEA)	≤ 0.08	0.084

The structural equation modelling (SEM) approach was used to validate the research model (see Figure 1). AMOS version 26.0 was used to analyze the hypothesized relationships generated from the research model (see Figure 1). Descriptive and inferential statistics were used to analyze the data. ANOVA tests were used to assess the degree of agreement on how TANePS improved employee performance in both organizations. The ANOVA determines whether there is a significant difference between the means.

FINDIGS

Adoption of TANEPS

The findings indicated that most respondents (67%, n=168) frequently completed their daily tasks easily using the TANePS in the categories of often, mostly, and always. This study assessed the use of various services in TANEPS, including user registration, e-tendering, e-payments, and e-contract management. Regarding user registration, the study found that almost half of the respondents in the GPSA (47%, n=47) and PPRA (48.5%, n=47) used TANePS for registration in the often and very often categories, respectively. Regarding e-tendering, findings indicated that two-thirds of the respondents agreed that they used TANePS for e-tendering both at PPRA and GPSA (88%, n=176) in the often and very often categories (See Table 2). Regarding e-contract management, more than half of the respondents did not use GPSA (60%, n=60) or PPRA (59%, n= 60) services (Table 3). Regarding the use of TANePS for e-payment services, the results indicate the often and very often categories, as illustrated in Table 4.

Table 2: TANePS use for E-Tendering

E-tendering		Frequency	Percent	Mean	Std. Deviation	Mode
Valid	Very Rarely	24	12	2.89	0.61	3.00
	Often	46	24			
	Very Often	130	64			
	Total	200	100			
Missing	System	0	0			
Total		200	100			

Table 3: TANePS use for e-Contract management.

	E-contract Management		Frequency	Percent	Mean	Std. Deviation	Mode
GPSA	Valid	Never	60	60	1.62	0..97	1.00
		Very Rarely	19	19			
		Often	11	10.5			
		Very Often	10	10			
		Total	100	99.5			
	Missing	System	1	0.5			
	Total		101	100			
PPRA	Valid	Never	60	59			
		Very Rarely	11	20	1.62	0.97	1.01
		Often	19	10			
		Very Often	10	10.5			
		Total	100	99.5			
	Missing	System	1	0.5			
	Total		101	100			

Table 4: Use of TANePS for e-payment service

TANePS for e-payment		Frequency	Percent	Mean	Std. Deviation	Mode
		GPSA				
Valid	Never	18	9	3.50	1.01	3.00
	Rarely	22	11			
	Often	20	10			
	Very Often	40	70			
	Total	100	100			
Missing	System	0	0			
Total		100	100			
		PPRA				
Valid	Never	18	9	3.50	1.01	3.00
	Rarely	22	11			
	Often	30	20			
	Very Often	30	60			
	Total	100	100			
Missing	System	0	0			
Total		100	100			

Factors influencing the adoption of TANePS

BM, SPSS and AMOS 26 were used to perform SEM for speculation testing. Table 5 lists the computed values for the different lists. Row1, 2, and 3 provided the chi-squared (χ^2), Degree of Flexibility (DF), and their proportions, respectively. Pushes 4, 5, and 6 show the goodness of fit (GFI), normalized fit (NFI), and root mean square error of estimation (RMSEA), respectively. The parameters indicate that the demonstration is solid and can be utilized to predict the connections among the builds (Shatta, Layaa, & Shayo, 2020).

Table 5: Model fitting parameters for SEM

Model fitting parameters	Recommended value	Model result
Chi-square (χ^2)		714.48*
Degree of freedom (DF)		186
Chi-square (χ^2)/df	≤ 3.00	2.84
Goodness of fit index (GFI)	≥ 0.90	0.945
Normalized fit index (NFI)	≥ 0.90	0.906
Root mean square error of approximation (RMSEA)	≤ 0.08	0.084

Note: N=200, $p<0.05$*

The path investigation displayed in Table 6 indicates that software design has a positive impact on the IT readiness of the divisions (b=0.696,

p=0.042). Furthermore, management policies had negative effects on the internal resistance of the division (b= -0.517, p=0.002), and internal resistance had a negative effect on the adoption of TANePS (b= -0.506, p=0.002). Two factors had positive effects on e-procurement adoption: IT readiness (b= 506, p=0.002) and management policies (b= 0.474, p=0.002). Consequently, the adoption of TANePS had a positive effect on effective procurement (b=0.674, p=0.007) and the reduction of imperfections (b=0.721, p=0.001).

IT readiness had no significant effect on inner resistance of divisions (b=0.689, p=0.106). Software design also had no positive effect on the inner resistance of the organization's offices (b= -0.732, p=0.301) or the adoption of TANEPS (b=-0.707, p=0.596).

Influence of TANePS on employee performance

The results of the one-way ANOVA, grouped by the outcome of TANePS on employee performance, indicated that there were statistically significant differences between the grouped means on the following: performance was better when using TANePS than before the use of TANePS, p>0.045 [F (2, 183=26.737, p=0.045]; TANePS increased the accuracy of production capacity, p>0.045 [F (2, 183=3.190, p=0.045], and TANePS shortened process cycle times, p>0.024 [F (2, 183=17.347, p=0.024].

Table 6: Result of path tests with a regression weight

Hypothesis	*Path*	*Critical Ratio*	*Sig. level*	*Standardized Estimate*	*Comment*
Ha	SD → ITR	1.567	0.042	0.696	Sig.
Hb	SD → IR	-2.056	0.301	-0.732	Not Sig.
Hc	ITR → IR	5.266	0.106	0.689	Not Sig.
Hd	MP → IR	4.592	0.002	-0.517	Sig.
He	MP → aTANePS	2.142	0.002	0.474	Sig.
Hf	ITR → aTANePS	0.947	0.002	0.506	Sig.
Hg	IR → aTANePS	5.383	0.002	-0.315	Sig.
Hh	SD → aTANePS	7.027	0.596	-0.707	Not Sig.
Hi	aTANePS EP →	7.843	0.007	0.674	Sig.
Hj	aTANePS RI →	6.573	0.001	0.721	Sig.

Note: b is the standardized estimate

Key*: SD= Software design, ITR= IT-readiness, IR= Internal Resistance, MP= Management Policies, aTANePS= Adoption of TANePS, EP= Effective Procurement and RI= Reduction of Imperfections*

DISCUSSION

This study found that a sizable proportion of respondents from both entities used TANEPS for e-tendering and e-payments. However, user registration and e-contract management experienced relatively low adoption rates, with nearly 50% of the respondents indicating that they had hardly ever used these services. The tendering procedure requires registered users; hence, the repercussions of low user registration utilization are substantial. Furthermore, the technical and semantic problems encountered during the registration process have been attributed to the difficulties in fully implementing e-registration. Registration questions are occasionally unclear, and some users do not fully comprehend how the system works. Additionally, ineffective registration is hampered by the sluggish performance of the system and user complacency. These findings are consistent with earlier studies conducted by academics, such as (Afolabi et al., 2022; Nurdin, 2021; Shatta, Layaa, et al., 2020) who also noted a similar trend in the use of e-procurement systems. Despite the deployment of this system, its full potential has not yet been realized.

Furthermore, this study showed that some questions in the tendering process were vague, necessitating more explicit responses. Owing to this ambiguity, users are reluctant to adopt this system. This conclusion is consistent with that of another study, which contends that successful program planning and solid software design are key factors in reducing end-user resistance to implementing e-tendering. Poor planning and design, on the other hand, heighten resistance and reliance on conventional paper-based approaches (Gihozo, 2020; Nyokabi, Biraori, & Wacera, 2023).

The findings indicated that the high use of e-payments was in line with other studies, which indicated that e-payments eliminate human errors and are always transparent, thereby improving efficiency throughout the procurement process. However, even though the system requires e-payments, it cannot be safe with regard to cyber security-related challenges (Kilay, Simamora, & Putra, 2022).

In this study, e-contract management services in TANePS are used at a low rate. Although the system was deployed to manage all procurement activities, the sampled entities used e-procurement for contract management at a relatively low rate. This implies that even though the system was deployed, not all its functionalities were used. These findings are in line with those of (Shatta, Shayo, & Layaa, 2020), who clearly stated that a reasonable number of procuring entities have not been fully using the system, and some have not deployed the system at all. This provided them the opportunity to use an old-fashioned procurement system. On factors enabling adoption of TANEPS, the software design had a positive impact on the IT readiness (b=0.696, p=0.042). Hence, the quality of software design in terms of user friendliness, security, and compatibility enable employees' IT readiness to effectively learn and embrace e-procurement.

Management policies negatively affected internal resistance (b= -0.517, p=0.002). Resistance to change is an impediment to the successful implementation of a new idea because end users believe that the change will harm their interests. However, when the management has a concrete plan, the amount of resistance decreases. This finding is in line with (Afolabi et al., 2022) who suggested that management initiatives aimed at exposing employees to new technology and dispelling their fears of adoption would enhance adoption rates. Thus, management policies need to be restructured to promote the benefits of using TANePS among employees to change their mindset towards using e-procurement.

The study found that internal resistance negatively affected the adoption of the TANePS (b= -0.506, p=0.002). Where there is internal resistance in the organization, it is impossible to deploy a system (e-procurement) because people will not use it. These results are in line with other findings (Biazzin & Cardoso, 2020; Opoku-Fofie, Asare-Bediako, & Asamoah, 2022) the finding also emphasized that organizations need to motivate their staff to cooperate and work together to adopt the new system. Furthermore, there is a need to promote the benefits of using the new system to change their mindsets. IT readiness (b= 474, p=0.002)) has a positive effect on the adoption of TANePS. This indicates that because individuals were prepared for an IT-related computer program, they would effectively embrace it. This finding is consistent with those of other studies (Marei, Daoud, Ibrahim, & Al-Jabaly, 2021; Masudin, Aprilia, Nugraha, & Restuputri, 2021).

At the same time, management policies (b= 0.649, p=0.002) had a positive effect on the adoption of TANePS. These findings are in line with other studies showing that top management policies and directives have a greater association with the deployment of e-procurement systems (Masudin et al., 2021; Shatta, Shayo, & Layaa, 2020). This finding suggests that top management leadership and smart policy design play vital roles in TANePS implementation. Consequently, TANePS adoption has a positive effect on effective procurement (b=0.674, p=0.007). This result highlights that TANePS has the potential to accelerate the achievement of higher process efficiencies such as reduced staff, reduced costs, reduced time, and increased process efficiency. This result is consistent with those of Afolabi et al. (2022) and Nani and Ali (2020), who reported that, in most cases, organizations adopt e-procurement to achieve the perceived results of the system. These results include improved effective procurement activities and reduced procurement shortfalls across organizations.

Furthermore, the adoption of TANePS has a positive effect on the reduction in imperfections (b=0.721, p=0.001). This means that TANePS makes it easier to attract many suppliers, increases competition among bidders, and reduces errors and imperfections in the procurement cycles. The results were consistent with those of (Ángeles López-Cabarcos et al., 2022) who observed that the use of e-procurement facilitates access to many bidders, and that increased competition among bidders leads to a reduction in shortcomings in the procurement process.

On the influence of TANePS on employee's performance, the study found that the use of TANePS led to better performance, increased accuracy of production capacity, and shortened process cycle times. The use of TANePS has led to a tremendous improvement in worker performance compared with the manual system that was previously used. It is also interesting to note that the system reduced the amount of time that the procurement processes took to complete the cycle. Similarly, Shatta et al. (2020) noted that the increasing use of the Internet and information technology has modified and encouraged businesses to transition from a traditional procurement and supply chain philosophy to a virtual e-procurement and an automated supply chain philosophy. Hence, the e-procurement system added speed and value to all avenues and activities of business and employee performance in the surveyed institutions.

The study presents valuable findings concerning the implementation and impact of TANePS, highlighting both successful outcomes and challenges. Although e-payments are widely appreciated for their efficiency and transparency benefits, the registration process for users and management of e-contracts face significant obstacles, including unclear procedures and resistance from users. The study reveals that management policies and software design play a crucial role in influencing the adoption of TANePS, with support from top-level management and user-friendly interfaces being key drivers for acceptance. The study emphasizes the importance of analyzing the specific context and provides practical recommendations for improving the utilization of TANePS, such as addressing internal resistance and enhancing system design. Furthermore, the study calls for future research to explore strategies for overcoming barriers to adoption and to evaluate the long-term effects of e-procurement on organizational performance. By doing so, it contributes to the ongoing discussions in this field.

CONCLUSION AND RECOMMENDATIONS

The study's findings lead to the following conclusions: An important development aimed at improving procurement processes in public organizations is the automation of procurement. However, in this situation, if some functions such as user registration and e-contract management services are not completely utilized, the stated goals of TANePS may not be achieved. Institutions must place a high prioritize essential components to facilitate the successful implementation of an e-procurement system, such as the supply of user-friendly software design, encouraging IT readiness among staff members for system use, and establishing supportive management policies. Additionally, the establishment of clear policies and instructions can be extremely important for reducing internal and external resistance, which if ignored, could undermine the system for selfish reasons. In this study, the use of TANePS significantly improved the efficiency in the procurement cycle, improved worker performance, increased the accuracy of production capacity, and shortened the process cycle times. Thus, for the continuous enjoyment of such benefits nationwide, it is necessary to ensure the following.

Firstly, to address resistance to the system, government procurement authorities should prioritize periodic reviews and maintenance, focusing

on revising difficult, ambiguous, and contested segments. Secondly, continuous training programs should be conducted by a team of PPRA technicians from various regions to ensure nationwide awareness of system usage. Thirdly, to support users facing technical challenges, government procurement authorities should strengthen a 24/7 call center with active IT technicians, providing unlimited technical support to vendors and thereby increasing competition. Fourthly, continuous monitoring and evaluation of management policies are essential to ensure the achievement of desired objectives, with a focus on fostering a culture of continuous learning and improvement within the TANePS framework. Additionally, fifthly, regular reinforcement of network security and stability is crucial to ensuring effective utilization of the nationwide procurement system. Moreover, sixthly, recognizing the importance of employee participation, stakeholders should prioritize involving users in the planning and design stages of system implementation to preempt internal resistance. Lastly, based on the study's findings, additional research should examine the impact of unutilized TANePS modules, such as e-auctions and e-catalogues, on employee performance, thus providing a comprehensive understanding of the system's potential benefits.

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