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EFFECTS OF E-PROCUREMENT PRACTICES ON THE PERFORMANCE OF PUBLIC ENTITIES

Boniface Emmanuel MWALUKASA
College of Business Education Dar es Salaam Tanzania

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Abstract:
Despite initiatives by the Government of Tanzania to ensure the availability of Information and Communication Technology infrastructure still, the utilization of e-procurement remains low. The current study investigates the effects of e-procurement practices focusing on e-sourcing, e-evaluation, and e-contract on public entities' performance. The study employed the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (DOI). A cross-sectional research design and mixed research approach were used. Data were collected from 30 respondents from the Bank of Tanzania Academy, a census survey was applied. Questionnaires were used to collect quantitative data and interview guides served as qualitative data collection tools. Quantitative data were analyzed using descriptive statistics and inferential statistics. Thematic analysis was employed for qualitative data analysis. The multiple regression model revealed that e-sourcing, e-evaluation, and e-contracts positively and significantly affect public entities' performance. The study concludes that e-sourcing, e-evaluation, and e-contracts contribute to improved public entities' performance. Therefore, procuring entities should invest in technological infrastructure that supports interoperability and enhances communication with stakeholders, provide regular training to staff and vendors to handle technical issues, and implement strong data security measures to build user trust and ensure system integrity.

Keywords:
e-procurement practices, public entities performance, e-sourcing, e-evaluation, e-contracting

1. Introduction

Integration of electronic procurement systems (EPS) in public procurement caused procuring entities to explore opportunities for organizations to improve procurement process efficiency and transparency as suppliers are assured of a fair and transparent process and are more likely to participate (Mandala and Ayoyi, 2024). EPS enables audit trails and tracking processes to enhance accountability while ensuring compliance with regulatory requirements. Public entities implement electronic procurement to benefit from reduced transaction costs, expand supplier search opportunities, and improve relationships between the procuring entity and suppliers (Rasheli, 2016). In addition, EPS provides real-time analytics and forecasting capabilities ensuring that organizations can make informed procurement decisions. E-procurement significantly affects organization performance, through advanced features such as e-registration, e-tendering, e-contract management, e-catalogue, e-payment, e-evaluation, e-sourcing, enterprise resource planning, e-informing, e-negotiation and e-auction (Mwangi and Kagiri, 2016). Furthermore, the major advantage of electronic sourcing lies in the competitive aspect, as suppliers bid for requirements (Mujakpa et al., 2016).

According to the OECD (2024) report, all OECD countries have adopted EPS systems to support various stages of the procurement cycle such as publishing and storing procurement information, announcing tenders, and notifying contract awards on national platforms. However, the extent of transactional functionality varies significantly. Mohungoo et al. (2020) categorized challenges in implementing e-procurement using the Technology-Organization-Environment framework (TOE). Technological challenges include user acceptance and usage, disruptive innovation characteristics of e-procurement, usage of digital signatures, security and privacy concerns, and technical support. Organizational challenges include organizational behavior, leadership attitude, lack of training and skilled personnel, and resistance to change. Environmental challenges include regulatory constraints on public procurement. Similarly,

Nasrun et al. (2016) highlighted technological challenges such as poor internet connectivity, resource constraints, and organizational and management characteristics as key challenges facing developing countries in adopting online purchasing. (Shatta et al., 2020) further noted that the perceived relative advantage of e-procurement has direct and indirect effects on e-procurement usage and performance. According to Gonzalez et al. (2019), performance is defined by an organization's actual outcomes measured against planned goals and objectives. Procurement performance specifically measures how well the procurement process meets objectives focusing on effectiveness and efficiency (Nyaribo and Muturi, 2017). Further, Sabiiti et al., (2017) noted that procurement performance is essential for good resource management and stewardship.

Electronic Procurement systems have the potential to positively affect organizational performance by enhancing transparency accountability and internal control (Chan and Owusu, 2022).
In Tanzania, the government has invested in information and communication technology (ICT) infrastructure, including the National ICT Broadband Backbone (NICTBB) and international submarine cables to support digital adoption across the sectors (MoFP, 2016; Sedoyeka and Sicilima, 2016). Despite the initiatives, the utilization of e-procurement systems remains low. Out of 171,414 registered businesses in Tanzania, only 18,231 have registered as tenderers on the National eProcurement System of Tanzania (NeST) (NBS, 2024; PPRA, 2024). Previous studies on e-procurement practices have largely examined practices such as e-tendering, e-invoicing, and e-payment (Rasto and Kibet, 2017), as well as e-auction, e-tendering, and e-ordering (Munyao and Moronge, 2018; Obiero and Ngugi, 2024), demonstrating a positive correlation between the practices and the performance of procuring entities. However, limited research has been done on understanding the effects of e-sourcing, e-evaluation, and e-contract practices on the performance of public procuring entities. Addressing the gap is essential to ensure that e-procurement is effectively utilized to improve organizational performance.

2. Literature Review

Theoretical Framework

This research study was guided by the Technology Acceptance Model (TAM) and Diffusion of innovation theory.

Technology Acceptance Model (TAM)

TAM was first introduced by (Davis, 1989) based on the Theory of Reasoned Action. TAM is an information systems-based theory that models how users arise to receive and practice a technology. The Technology Acceptance Model (TAM) states that perceived usefulness (PU) and perceived ease of use (PEOU) are key factors shaping users' attitudes toward technology. According to TAM, behavior significantly influences actual usage behavior. The theory is therefore directly relevant to the current study as it examines whether employees and vendors perceive the system as enhancing efficiency, reducing costs, and being user-friendly. Such perceptions are likely to lead to higher adoption rates and increased usage. In Addition, e-procurement quality dimensions such as usability, processing efficiency, and professionalism significantly influence the levels of e-procurement acceptance (Brandon-Jones and Kauppi, 2018).

Diffusion of Innovation Theory (DOI)

DOI theory was developed by Rogers (2003) as a framework for understanding factors influencing new technology adoption such as e-procurement systems within public procuring entities to include relative advantage, compatibility, complexity, trialability, and observation. Further, the compatibility of e-procurement systems with existing procurement processes and the perceived complexity of implementation hinder the adoption process (Saastamoinen, Tammi and Reijonen, 2018), innovations should be simple and user-friendly in design to be adopted (Omorodion and Osifo, 2020). E-procurement systems with enhanced communication features facilitate collaboration between PPE and vendors, increasing perceived benefits by promoting valuable feedback and active vendor engagement thus supporting the implementation process (Bahr, Mahzan and Kong, 2013). Factors including lack of awareness, perceived risk, and insufficient training can hinder vendor engagement and affect the effectiveness of e-procurement (Saastamoinen, Tammi and Reijonen, 2018). Engagement contributes to improved performance in public entities (Kumar and Ganguly, 2020). In addition, trialability allows vendors to experiment with the system before full

implementation, while observability makes the benefits of e-procurement visible and demonstrable through successful cases or peer experiences (Myovela, Ng'elenge, and Kisawike, 2023).
Integrating e-procurement systems in public procurement enhances the performance of procuring entities by improving transparency, accountability, and efficiency, leading to reducing corruption risk associated with public contracts (Jiménez, Alfredo, et al., 2022). E-procurement practices such as e-sourcing, e-valuation, and e-contract management enhance efficiency and improve transparency and accountability. Nandankar and Sachan (2020) found that perceived ease of use, perceived usefulness, trust, organization size, organization readiness, and behavior intentions are the most critical drivers of e-procurement adoption, usage, and performance. (Mwangi and Kagiri, 2016; Munyao and Moronge, 2018) revealed that the adoption of e-tendering, e-sourcing, enterprise resource planning, and e-informing positively related to entities' performance.

Linkage between e-Sourcing and Public Procuring Entities Performance
E-sourcing is the foundation of e-procurement as it facilitates the identification and selection of suppliers electronically to reduce transaction costs and speed up the procurement process (Munyao and Moronge, 2018). According to Rotich, Benard and Micheni (2016) e-sourcing significantly impacts procurement efficiency. Kimutai and Ismael (2016) noted that electronic sourcing improves Supply Chain Performance by reducing the time, expenses, and value of the provided services.
H1: There is a positive significant effect of e-sourcing practices on public procuring entities' performance

Linkage between e-Tender Evaluation and Public Procurement Performance
E-tender evaluation improves transparency in the procurement process as stakeholders can access bidding procedures and outcomes information to mitigate corruption and favoritism and build trust (Boafo and Ahudey, 2020). Further, e-evaluation reduce the time required for tender submission and leads to faster delivery of goods and services to meet demands (Obiero and Ngugi, 2024). E-tender evaluation improves relationships between public entities and vendors through fair competition and equal treatment of all bidders to enhance supplier trust and collaboration enabling long-term partnerships leading to improved service delivery (Boafo and Ahudey, 2020). The following hypothesis developed.
H2: There is a positive important impact of e-evaluation operations on public procuring entities' performance

Linkage between e-Contract and Public Procuring Entities Performance
E-contract systems improve operational efficiency by automating contract management processes by enabling quick document generation, automated workflows such as automated email alerts, task reminders, and electronic signatures for quick signing of contracts leading to reduced time spent on contract approval, processing costs such as travel costs and human errors (Waithaka and Kimani, 2021). E-contracting features promote compliance with regulatory requirements such as public procurement frameworks through standardized templates and automated reminders for contract renewals or obligations to avoid legal challenges and corruption (Mahuwi and Israel, 2024). The electronic contract connected to procurement operations can affect the efficiency and effectiveness of procurement operations in terms of time, price, and excellence development of the client services or supplies (Munyao and Moronge, 2018). Therefore, based on the above theoretical justifications, the study came up with the following hypothesis:
H3: There is a significant positive effect of e- contract management on the performance of public procuring entities.
Several studies (Mohungoo, Brown and Kabanda, 2020; Akannobe and Ajongba, 2023) identified challenges facing e-procurement implementation including e-procurement acceptance and usage, security and privacy of technology, and technical aspects related to digital infrastructure, stakeholders' behavior, leaders' behavior, lack of training and skilled personnel, and regulatory framework for public procurement.

3. Research Methodology

3.1 Research Design

The current study employed a cross-sectional research design enabling data to be collected from respondents at a single point in time and allowing the researcher to test the relationship and correlations between different variables (Saunders, Lewis and Thornhill, 2009).

3.2 Research Method/ Approaches
The study employed a mixed research approach as it combines both qualitative and quantitative data, allowing researchers to gain a more holistic view of the research problem and enhance the credibility and validity of the results (Tashakkori and Teddlie, 2008)

3.3 Study Area
The current study was conducted at BOT Academy located in Mwanza Tanzania. It is an Academic Institution owned by the Central Bank of Tanzania (BOT). Studying e-procurement practices at the institution can promote broader improvements in public procurement. The Academy has a population of 30 employees.

3.4 Sample
The study employed a census where data will be collected from every individual as the sample size is small, hence reducing sampling errors and bias.

3.5 Data Collection Methods and Approach
For the qualitative data, the interview method was used as a data collection method and the interview guide as a data collection tool. Sampling was determined by reaching the saturation point. Structure questionnaires were used for quantitative data collection, utilizing the Five Point Likert scale (Bryman et al, 2015).

3.6. Validity and Reliability of Data
Cronbach's Alpha was used to assess the internal consistency of a set of items designed to measure the same construct to test the coefficient of reliability. The consistency is conveyed as a coefficient between 0 and 1. The greater the coefficient the more consistency for the test of data. Malhotra (2004) stated that the standard lowest value suggested for Alpha's method is 0.6.

Table 2: Reliability

Variables	No. of sub-variables	Cronbach's Alpha test	Remarks
E-sourcing	7	0.826	Reliable
E-evaluation	3	0.843	Reliable
E-contract	5	0.808	Reliable
Performance	6	0.840	Reliable

Source: Researchers' Findings (2024)

To ensure the validity of the research instrument, the questionnaire was reviewed by an expert in the field to assess whether represents the constructs being measured. Additionally, a pilot study was conducted to support the content validity of the survey instrument (Muli, Bwisa and Kihoro, 2016).

3.7 Data Management and Analysis
Quantitative data analysis involves the application of both descriptive and inferential statistics to interpret numerical data. Thematic analysis was used for qualitative data. Inferential statistic was utilized to test hypotheses and determine the effects of each e-procurement practice on procuring entities performance.
The model equations is as shown below;

$$Y = \propto + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (i)$$

Where; Y= Public procurement performance α = Constant term β = Beta coefficient X1= e-sourcing X2 = e-evaluation of bidders, X3 = e-contract

4. Results and Discussion

The researcher distributed the questionnaire to a selected sample of 30 respondents. The profile of respondents included three categories: Procurement department, IT department, and user department who were the main users of the E-procurement in Bank of Tanzania Academy Mwanza. The key informants were employees in the Department of Procurement Management Unit. Out of 30 distributed questionnaires, 26 (86.7%) were managed to be filled and returned to the researcher.

4.1 Effect of e-Sourcing on the Performance of Public Procuring Entities

Respondents were asked to indicate the extent to which e-sourcing affects public procuring entities' performance. The score was identified using a Likert measurement for 1-5 whereby: 1= Strongly Disagree 2 = Disagree 3= Neutral, 4=Agree, and 5 = Strongly Agree.

Table 3: Summary of the results on the effects of e-sourcing on the performance of public entities

	SD	D.	Neu.	A	SA	Mean	Std. Dev.
Cost effective	3(11.5%)	1(3.8%)	0 (0.0%)	7(26.9%)	15(57.7%)	3.64	1.02
Saves time	2(7.7%)	2(7.7%)	0 (0.0%)	5(19.2%)	17(65.4%)	3.57	0.96
Transparency	1(3.8%)	2(7.7%)	0 (0.0%)	10(38.5%)	13(50%)	3.44	0.91
Accountability	1(3.8%)	2(7.7%)	0 (0.0%)	12(46.2%)	11(42.3%)	3.28	1.11
Competition attraction	1(3.8%)	2(7.7%)	0 (0.0%)	5(19.2%)	18(69.2%)	3.54	1.10
Ensure value for money	2(7.7%)	1(3.8%)	0 (0.0%)	12(46.2%)	11(42.3%)	3.41	1.25

Source: Researchers' Findings (2022)

Respondents provided average ratings of performance metrics, with (84.6%) strongly agreeing that E-procurement is cost-effective. Additionally, 84.6% felt that e-procurement saves time, and 88.5% agreed that e-procurement promotes transparency. Regarding accountability and competition, 88.5% agreed that e-procurement enhances accountability and 88.4% agreed it increases competition. Similarly, 88.5% perceived that e-procurement ensures value for money. The findings suggest that respondents generally agree on the positive effects of e-procurement with minimal variability in opinions.

Moreover, during an interview, respondents added that;

… selecting suppliers online assists in simplifying the timely acquisition of goods by advertising through official media, ensuring that the information is circulated to the intended suppliers hence it saves more time.

…However, some vendors choose not to participate in e-procurement because demand for their products already exceeds their supply to customers not using e-procurement…. Some vendors have concerns regarding the trustworthiness of e-procurement

Another respondent mentioned that:

… lack of awareness, and the cost of registration for the system and procedure causes many vendors to fail to use e-procurement.

4.2 Effect of e-Evaluation on the Performance of Public Entities

Table 4: Summary Results of The Effect of E-Evaluation on Performance of Public Entities

	No extent	Little extent	Moderate	Large extent	Very large extent	Mean	Std. Dev.
Awareness of e-evaluation	1(4%)	2 (8%)	0 (0%)	17(65%)	6 (23%)	4.47	0.87
Technical and financial criteria	1(4%)	0	0	19 (73%)	6(23%)	4.87	0.56
E-evaluation guarantees efficiency	2(8%)	1(4%)	1(4%)	13(50%)	9(35%)	4.56	0.90

Source: Researchers' Findings (2024)

Table 7 findings show that 88% of staff are aware of the electronic evaluation within E-procurement. 96% of the respondents agreed that applying technical and financial criteria promotes quality and fairness. Additionally, 85% of respondents acknowledged that electronic evaluation supports organizational performance through improved efficiency and effectiveness.

During an interview, the following comments emerged

"…. bidder's evaluation in e-procurement simplifies evaluation process whereby bidders are evaluated based on the pre-determined evaluation criteria and the system guides evaluator from stage to stage."

Another respondent added,

"…. Electronic evaluation reduces fraudulent practices and increases transparency and efficiency in supply chain management increase the extent of procurement officers to comply with procurement procedures….."

The findings of the research align with Boafo and Ahudey (2020) findings that electronic evaluation plays a critical role in the procurement process by improving transparency, minimizing corruption and favoritism, saving time, meeting customers' demands, enhancing vendors' trust (Obiero and Ngugi, 2024).

4.3 Effect of e-Contracts on the Performance of Public Entities

The research aimed to evaluate the effect of electronic contracts on public procurement performance. Respondents of the study were requested to rate the degree to which the electronic contract impacts the public procurement performance. The ratings were done using a Likert scale of 1-5 where: 1= Strongly Disagree 2 = Disagree 3= Neutral, 4=Agree, and 5 = Strongly Agree.

The Mean scores and standard deviation were applied to ranking the responses from respondents as illustrated in Table 5.

Table 5: Summary results on the influence of e-contract on the performance of public entities

	SD	D	N	A	SA	Mean	Std. Dev.
Compliance with laws	1 (3.8%)	2 (7.7%)	0 (0.0%)	12(46.2%)	11(42.3%)	4.41	0.84
Transparency	2(7.7%)	1(3.8%)	0(0.0%)	17(65.4%)	6(23.1%)	4.08	0.95
Accountability	1(3.8%)	3 (11.5%)	0(0.0%)	13(50%)	9(34.6%)	4.00	0.99
Organization Culture	1(3.8%)	1(3.8%)	0(0.0%)	10(38.5%)	14(53.8%)	4.00	0.65
Auditing	1(3.8%)	2(7.7%)	0(0.0%)	11(42.3%)	12 (46.2%)	3.96	0.73

Source: Researchers' Findings (2024)

Regarding the compliance levels of public procurement laws and regulations by procuring entities, findings indicate that e-procurement significantly influences public entity adherence to rules and regulations. Specifically, 88.5% of respondents agree that e-procurement positively affects public procurement performance. Furthermore, 88%, of respondents suggested that e-contracts promote transparency in public procurement, 84.6% accountability, 92.3% organization culture, and 88.5%. auditing.

These findings are in line with Aluonzi, Oluka and Nduhura (2016) findings that online contracts play a significant role in achieving objectives related to quality standards, timely delivery, compliance with budgetary constraints, and promoting time-saving during contract management and execution.

4.4 Effects of E-procurement Practices on the Performance of Public Procuring Entity

Table 6: Summary results on the usage of E-procurement towards the performance of procuring entity

	Mean	Std. Dev.
E-procurement usage reduces the possibility of fraud and corruption	3.40	0.586
E-procurement usage reduces errors in procurement Procedures	3.40	0.639
Promote transparency	3.36	0.507
E-procurement usage makes Public Procurement Cost effective	3.33	0.663
E-procurement usage emphasizes value-for-money procurement	3.30	0.634

Source: Researchers' Findings (2024)

Table 9 shows that the mean score in each item ranged from 3.30 and 3.40, indicating general agreement among respondents, suggesting that respondents concurred with all six statements. Specifically, they agreed that the use of e-procurement reduces the likelihood of fraud and corruption (M=3.40 and SD=0.586); enhances transparency in tender competition (M=3.36 and SD=0.507); is cost-effective (M=3.33 and SD=0.663) and emphasize value for money in procurement (M=3.30 and SD=0.634). This denotes that e-procurement has several advantages.

During an interview, the interviewee noted that:

"Despite the benefits of e-procurement, there are risks in its implementation such as cyber security concern and technical failure"

Another interviewee added that:

for e-procurement practices to be used especially among vendors, need to be user-friendly, and affordable, with reasonable costs for computer hardware, and registration fees.

4.5 Inferential Statistics

4.5.1 Multiple Linear Regressions Analysis

Multiple linear regression analysis was conducted to assess the effects of various independent variables on public procurement performance. The results of the multiple regressions analysis are presented in the table 8, 9, and 10.

4.5.2 Model Summary

According to the model summary in Table 8, the R-value is 0.865 indicating a strong correlation between the combined predictor variables (e-sourcing, e-evaluation, and e-contract) and dependent variable (public procurement performance). The coefficient of determination (R2) illustrates the degree of variation in the dependent variable (performance of public procurement) that is explained by the independent variables; e-sourcing, e-evaluation, and e-contract. The R2 value of 0.748 indicates that 74.8% of variation in public procurement performance can be explained by the procurement practices. Overall the model demonstrates strong predictive capability.

Table 8: Model Summary

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
	0.865*	0.748	0.699	0.837

a. Predictors: e-sourcing, e-evaluation and e-contract
Source: Researchers' Findings (2022)

4.5.4 Analysis of Variance

The results in Table 9 show that the F value for the 15.612 is significant, with a p-value of 0.000, which is below the 0.05 threshold at a 5% significance level. This indicated that the overall model linking E-procurement to the performance of public procurement is statistically Significant. Therefore, the combined effects of e-sourcing, e-evaluation, and e-contract are statistically substantial in explaining public procurement performance.

Table 9: Analysis of Variance (ANOVA)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	32.843	1	10.861	15.612	0.000
Residual	70.126	25	0.700		
Total	102.969	26			

a. Dependent Variable: Performance of Public procurement
b. Independent variables (Constant), e-sourcing, e-evaluation, and e-contract
Source: Researchers' Findings (2024)

4.5.3 Regression coefficients

The study aimed to determine the effect of e-procurement practice variables specifically e-sourcing, e-evaluation, and e-contract on public procurement performance at the selected entity. The results are shown in Table 10.

Table 10: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.234	0.072		3.418	1.000
E-sourcing	0.552	0.073	0.512	1.640	0.000
E-evaluation	0.361	0.073	0.301	3.745	0.027
E-contract	0.103	0.073	0.108	1.258	0.012

a. Dependent Variable: performance of Public procurement
Researchers' Findings (2024)

The regression model equation is explained as follows:
$Y = 1.234 + 0.552X_1 + 0.361X_2 + 0.103X_3$
Where;

Y= Public procurement performance
X_1= e-sourcing
X_2 = e-evaluation
X_3 = e-contract

The results revealed that e-sourcing had a Beta coefficient of 0.552, (p-value= 0.000), e-evaluation had a Beta coefficient of 0.361, (p-value= 0.027) and e-contract had a Beta coefficient of 0.103, p-value= 0.012, all of which were statistically significant at 5% level. The findings indicate that e-sourcing, e-evaluation, and e-contract have positive and statistically significant effects on the performance of public procurement performance in Tanzania to the extent of 55.2%, 36.1%, and 10.3% respectively. Scovia and Asiimwe (2024) noted that e-procurement' positive effects include enhancing transparency, mitigating the risk of corruption, and cost-saving

5. Conclusions and Recommendations

5.1 Conclusions

Study findings revealed a positive effect of e-procurement practices, specifically, electronic sourcing, e-evaluation, and e-contract practice on public procurement performance at the Bank of Tanzania Academy in Mwanza. Correlation and regression analysis have shown that e-sourcing has a significant positive effect on procurement performance by reducing procurement costs, saving time, and enhancing competition and transparency. E-evaluation was found to improve performance by promoting fairness and reducing errors. E-contracting was shown to enhance compliance with public procurement laws, transparency, and accountability with procurement practices. Effective utilization of e-procurement practices, will build trust to vendors and cause them to participate in public procurement tenders. The study concludes that for electronic procurement practices to be adopted by employees and vendors need to be easy to use, perceived to be useful, and compatible with existing systems. This will be a strategic option for enhancing the organizations' efficiency in procurement operations to improve performance.

5.2 Recommendations

This section provides recommendations on the findings to the concerned stakeholders:

- Public entities should invest in the necessary technological infrastructure, regular training, and capacity-building programs for procurement staff and vendors to be equipped to handle technical issues.

• Need to promote interoperability with other procurement systems to improve the procurement process by ensuring a smooth flow of information across procurement stages to increasing efficiency and reducing delays in the procurement process.

• Public entities need to ensure data security and integrity by implementing strong cyber security measures to safeguard sensitive procurement data while ensuring transparency to increase trust in the system and encourage suppliers to participate in using e-procurement.

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