

The Influence of Digital Systems on Public Asset Management Practices in Tanzania: A Case of Selected Public Higher Learning Institutions

Mary Mushi¹, Deus Shatta²

¹Department of Management Sciences, National Institute of Transport, Tanzania

²Department of Management Sciences, National Institute of Transport, Tanzania

Email: mariasambuo@gmail.com

Abstract

The rapid advancement of digital technologies and systems has fundamentally reshaped how public sector organizations operate and deliver services, although the influence of digital systems on public asset management practice is yet to be explored. The study assessed the influence of digital systems on public asset management practice in selected public higher learning institutions such as the College of Business Education and Dar es Salaam Institute of Technology. Specifically, it examined the influence of e-procurement system on public asset management practice. The study adopted a pragmatist research philosophy and a mixed methods approach, operationalized through a convergent mixed methods design. A sample size of 63 respondents was selected using purposive (10) and random sampling techniques (53). Respondents were administered with questionnaires and in-depth interviews. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were analysed using content analysis. The results reveal that e-procurement systems positively influence public asset management practice in Tanzanian higher learning institutions. This positive influence heavily depends on overcoming significant infrastructure, capacity and system reliability challenges. Similarly, the findings reveal an R^2 of 0.634, indicating that the model explains 63.4% of the variation in public asset management practices, which represents a stronger model fit. The remaining 36.6% of the variation can be explained by other unmeasured factors, such as localized macroeconomic conditions, organizational culture and specific public sector policies. It is concluded that, higher learning institutions need to ensure that assets are acquired optimally, tracked transparently and maintained to maximize institutional value. The study recommends aligning digital procurement (NeST), asset registries and management information systems with capacity building on staff and IT infrastructures.

Keywords: E-Procurement Systems, Digital Registries, Government Asset Management Practice Information Systems; Public Asset Management Practices.

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Introduction

Globally, the rapid advancement of digital technologies and systems have fundamentally reshaped how public sector organizations operate and deliver services (Tiwari et al., 2023). Yet, the influence of digital systems on public asset management practices in public higher learning institutions is yet to be explored in Sub-Saharan Africa and in particular Tanzania. Governments in sub-Saharan Africa are increasingly turning to digital tools to streamline processes, reduce operational costs and enhance the delivery of public services, providing

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greater accessibility to citizens and increasing overall satisfaction as a focus towards enhancing public asset management practice (Engkus, 2024). Moreover, research indicates that public sector organizations that successfully incorporate digital technologies are typically led by individuals who focus on ongoing learning and development, equipping their teams to handle the challenges posed by the expenses incurred in technologies (Jana et al., 2021).

To enhance public asset management practices, digital systems are crucial for improving public asset management practice in developing countries such as Tanzania, offering benefits like enhanced efficiency, transparency and better decision-making through real-time data and automation (Goyal, 2022). However, these implementations face significant challenges, including a lack of Information Technology (IT) infrastructure, limited financial resources, a shortage of skilled personnel and resistance to change (Candido et al., 2021). Also, successful digital transformation requires comprehensive training, supportive organizational culture, and adequate funding to overcome these obstacles where e-procurement in various institutions is utilized (Ilankoon et al., 2019).

Kumar (2019) reported that implementing e-procurement systems widely increases the effect of accountability and transparency on anticorruption initiatives. By utilising technology, e-procurement raises the standard of integrity, lowers the influence of human errors and increases the general effectiveness and equity of procurement processes (Mahuwi and Israel, 2024). According to the World Bank (2022), digital systems enable governments to improve operational efficiency, enhance transparency, and create inclusive public services by promoting open data and evidence-based decision-making.

Waryoba et al. (2024) and Shen et al. (2022) highlight the growing emphasis on digital systems in the Tanzanian public sector, that primarily focus on improving efficiency, transparency and governance, with implications for public asset management practices. Specific findings related to public asset management practice indicate both the potential benefits and ongoing challenges although with a little attention to the influence of e-procurement systems that pose the gap to be filled. Moreover, there have been scarce studies examining the same in various higher learning institutions such as College of Business Education (CBE) and Dar es Salaam Institute of Technology (DIT) as these institutions are entitled to serve a great amount of people whose efficiency requires the enhancement of digital systems.

Previous studies on digital transformation in Tanzania's public sector have largely focused on citizen-facing platforms such as e-tax systems [on tax collection, revenue tracking or general administrative e-services], the Government e-Payment Gateway [GePG], and general local government service portals or broad financial management information systems (like FMIS/MUSE), leaving internal, back-office public asset management relatively under-researched (Mahuwi and Israel, 2024). This study moves away from external customer-facing e-services to examine the direct operational, financial and accountability impacts of digital systems on the end-to-end lifecycle of public assets and evaluate institutional alignment with the Ministry of Finance's centralized asset tools (GAMIS) and updated statutory frameworks.

As a premier public higher-learning institution specializing in business, accountancy, procurement and ICT-driven management programs, CBE represents an environment where financial and administrative theory meets direct public sector asset governance (Waryoba et al., 2024). CBE is also actively expanding its footprint in digital technology and business solutions, making it an ideal site to observe how digital management policies are

conceptualized and applied internally. Similarly, as a leading public technological and engineering institution, DIT manages a vast, high-value inventory of physical infrastructure, specialized laboratories, technical machinery and innovation equipment (World Bank, 2022). DIT's heavy reliance on physical technical assets and its active role in national digital and industrial innovations (such as recognized tech-based awards and digital training frameworks) make it a high-intensity environment for testing whether digital tracking prevents asset loss, under-utilization or audit queries. This study aimed at assessing the influence of digital systems on public asset management practices to fill the gap that exists.

Materials and Methods

Description of the Study Area

The study was conducted at the College of Business Education and Dar es Salaam Institute of Technology, focusing their main campuses located in Dar es Salaam although they have branches such as Mwanza, Dodoma and Mbeya (for CBE) and Songwe, Mbeya and Dodoma (for DIT). The justification for its choice is that despite extensive research on the nexus between digital systems and public asset management practice, a knowledge gap exists, concerning higher learning institutions such as CBE and DIT in Tanzania where their asset management practice are essential (Waryoba et al., 2024). Also, conducting a study on digital systems and public asset management at the College of Business Education (CBE) main campus and the Dar es Salaam Institute of Technology (DIT) is justified by their unique institutional dual-focus on technical engineering and specialized business/logistics education compared to general or liberal arts public universities in Tanzania.

Research Approach and Design

The study utilized a mixed methods approach. A mixed methods approach combines quantitative (numerical) and qualitative (descriptive) data to provide a complete and well-rounded understanding of a research problem towards enabling triangulation of data. Besides, the study adopted the convergent mixed method design that involves collecting and analyzing both quantitative (numbers) and qualitative (words) data at the same time (Creswell, 2018). This increases the confidence in the results.

Study Population

In this study the target population included top management such as Rectors of the two institutions and PMU staff from two institutions. CBE involved 43 members while DIT involved 32 members thereof. This population amounts to 75 top management and non-management staff (CBE & DIT Human Resource Report, 2024).

Sampling Techniques and Sample Size

Simple random sampling procedure was used to select PMU staff. The researcher was able to identify and clearly define the target population, and create a complete list of all members in the population. Then a randomized method (i.e. simple random sampling) was selected and

each member was assigned a unique number; while using a random number generator to pick the required sample size. Verification was done to ensure that the selected group accurately reflected the target size and criteria (Kothari, 2019).

Similarly, purposive sampling procedure was used to select top management officials. This targets information-rich cases to give deep, meaningful insights (Creswell, 2018). Therefore, the researcher focused only on the people/respondents needed.

The sample size was determined using Yamane (1967) formula. Where n is the sample size, N is the total target population, in this case, the 75 population size obtained, and e is the error rate, in this case 5%. The sample size for this study is calculated as shown below.

$$n = \frac{N}{1+N(e)^2}$$
 where N = the Total Population; e = the margin of error (5% has been used to obtain the best sample given the population size); n = the sample size

$$n = 75 / 1 + 75 (0.05)^2; n = 63$$

Therefore, the sample size is 63 respondents.

Data Collection Tools

The study employed the questionnaires and interviews as primary data collection tools. The closed-ended questionnaires in the form of Likert type scale were administered to PMU staff at the two institutions, self-administered and managed with drop and pick method. In-depth interviews allowed the researcher to explore complex, personal topics in a conversational setting, capturing the rich emotions, underlying motivations and subjective experiences that quantitative surveys often miss.

Data Analysis

Quantitative data were analyzed descriptively through the IBM SPSS Statistics (Statistical Package for Social Sciences) version 26 in terms of frequencies and percentages. Descriptive analysis allowed the researcher to summarize large datasets, identify key patterns, detect outliers and formulate targeted hypotheses for future explanatory studies. Moreover, multiple regression analysis was used to analyse the relationship of variables for the quantitative data. The regression model formula was utilised;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Whereby:

Y = Dependent Variable (public asset management practice); β_0 = y-intercept (constant); β_1 = regression coefficient for e-procurement systems; β_2 = regression coefficient for digital registries; β_3 = regression coefficient for Government asset management practice information systems; X_1 = e-procurement system; X_2 = digital registries; X_3 = Government asset management practice information systems; ϵ = error term.

Qualitative data from in-depth interviews was coded and analyzed through content analysis and coded from the interview transcripts (Saunders et al., 2017). Content analysis helped in handling massive datasets efficiently, eliminating subject reactivity and recall bias, and bridging the gap between qualitative context and quantitative measurement.

Results and Discussion

Influence of e-Procurement System on Public Asset Management Practice

The objective examined the influence of e-procurement system on public asset management practice. Questionnaires were administered to PMU staff while in-depth interviews being carried to top management officials. The results are organised and summarized in Table 3.1 as follows.

Table 3.1: Influence of e-procurement system

Statement	% strongl y agree	% Agree	% not sure	% disagree	% strongly disagree
The use of e-procurement systems improves the efficiency of acquiring public assets	85	15	0	0	0
E-procurement systems help reduce procurement delays in our institution	80	0	0	20	0
The e-procurement platform ensures transparency in the acquisition of public assets	95	5	0	0	0
Our institution relies on e-procurement systems for managing procurement-related information	90	0	10	0	0
E-procurement systems facilitate better monitoring of asset purchases	80	20	0	0	0

The results in Table 3.1 reveal that 85% of respondents strongly agreed while 15% of respondents agreed that the use of e-procurement systems improves the efficiency of acquiring public assets. This signifies a strategic shift to replace manual, paper-based processes with automated, digital workflows. This transformation drives cost savings, increased transparency and faster procurement cycles. It was found that when respondents such as procurement officers, finance staff and administrators in higher learning institutions like the CBE and DIT evaluate e-procurement systems like NeST, they report overwhelmingly positive impacts on efficiency, alongside a few systemic and infrastructure challenges. This supports the argument

by Tiwari et al (2023) who opined that the transformation from manual to digital technology links procurement directly to an institution's asset register as every asset purchased can be digitally traced from the tender stage to delivery and lifetime utilization. Therefore, for CBE and DIT, this minimizes asset mismanagement, lowers the risk of equipment being unaccounted for and curbs opportunities for corruption or resource leakage.

The interviewees were of the following views;

At CBE and DIT electronic platforms have left an unalterable digital footprint as every action, approval and rejection is recorded with a timestamp and the user ID. E-procurement has allowed the management to review historical data on asset performance, vendor reliability and recurring maintenance costs. Moreover, the successful influence of these systems depends on adequate ICT infrastructure, stable internet connectivity and staff capacity (Interviewees 1, 3 & 7).

Moreover, respondents further opined that automation only governs the purchasing stage and it does not inherently guarantee the physical management, tracking or maintenance of those assets once delivered. However, emphasizing centralized e-procurement procedures such as Tanzania's NeST system; can slow down emergency asset acquisitions, leading to bureaucratic delays that negatively impact the day-to-day operations of academic departments and campus workshops.

On the other hand, the results in Table 3.1 reveal that 80% of respondents strongly agreed that e-procurement systems help reduce procurement delays in the institution. This implies that the institution's purchasing cycle is significantly shortened through the elimination of manual bottlenecks and suggests streamlined workflows, automated approvals, faster supplier communication and enhanced transparency which collectively accelerate the acquisition of goods and services needed for daily institutional operations. It was found that moving away from paper-based, manual tendering processes shifts staff effort from repetitive documentation to strategic asset planning, enabling faster turnaround times for departmental requisitions. This is in line with Matekenya and Moyo (2022) who reported that using digital platforms, the internal audit units and governing bodies of institutions can access real-time status updates on tenders and deliveries, minimizing procedural irregularities and procurement lead times.

The interviewees were of the following views;

E-procurement at our institution has eliminated physical paperwork, courier costs and in-person bidding travel, resulting in substantial financial savings. This allows institutions to optimize their limited public funds. Also, when procurement is processed electronically, the data transfers directly into the institution's asset register, creating a clear audit trail from the moment an asset is requested to when it is decommissioned (Interviewees 3, 5 & 8).

Moreover, 20% of the respondents disagreed from the fact that e-procurement systems inherently reduce delays when that automated systems often introduce new, complex bottlenecks and if the underlying infrastructure, technical skills and legal frameworks are not adequately prepared. In Tanzanian higher learning institutions like the College of Business Education and the Dar es Salaam Institute of Technology, systemic constraints often transform expected electronic efficiency into operational delays. Therefore, frequent internet downtime and poor network connectivity, particularly in peripheral campus locations, mean that electronic bidding and approval processes can take longer than traditional manual methods.

Similarly, the results in Table 3.1 reveal that 95% of respondents strongly agreed while 5% of respondents agreed that the e-procurement platform ensures transparency in the acquisition of public assets. This signifies that the system eradicates subjective decision-making by creating a rigid, verifiable and open digital trail. This shift from manual to electronic processes aims to eliminate corruption, ensure fair competition among vendors and promote strict adherence to the Public Procurement Regulatory Authority (PPRA) guideline. It was found that every step of the purchasing process from tender advertisement to bid evaluation and contract award is logged automatically into the national electronic system (such as the NeST). This concurs with Waryoba et al (2024) who stated that e-procurement platform forces standard, competitive bidding and automated evaluation where possible.

The interviewees were of the following views;

E-procurement platforms have prevented internal staff at CBE or DIT from steering contracts toward specific, preferred suppliers. It effectively levels the playing field for all vendors participating in the tender (Interviewees 5 & 10)

Moreover, respondents were of other opinions that e-procurement only guarantees transparency during the bidding and tendering phases. Because it lacks end-to-end integration with inventory and asset management practice, staff can still alter specifications, manipulate quantities received, or mismanage physical assets offline, leaving digital records technically correct but functionally corrupt.

Furthermore, the results in Table 3.1 reveal that 90% of respondents strongly agreed that our institution relies on e-procurement systems for managing procurement-related information while 10% of respondents being unsure of the matter. This signifies a commitment to digital transformation, regulatory compliance, and operational efficiency within the Tanzanian public sector. It was found that with such a commitment an institutional effort aligns with the Public Procurement Act, ensuring that taxpayer-funded assets and purchases are documented, controlled and audited transparently. This concurs with Ahmad et al (2025) who contended that an organization commitment to e-procurement systems seeks to reduce procurement lead times, minimize human errors and ensure value for money when procuring resources. Yet, asserting reliance on these systems also implicitly acknowledges the common hurdles faced by Tanzanian public institutions.

The interviewees were of the following views;

Relying on e-procurement systems does not guarantee effective public asset management practice at our institutions, as these platforms are often limited by poor integration with asset tracking, systemic ICT capacity gaps and bureaucratic resistance (Interviewees 4, 8, & 10)

Moreover, the respondents were of the other opinions that technological infrastructure such as internet reliability and data security remains a major concern for electronic data management in the Tanzanian public sector.

Finally, the results in Table 3.1 reveal that 80% of respondents strongly agreed while 20% of respondents agreed that e-procurement systems facilitate better monitoring of asset purchases. This implies a shift from manual paper-based methods to digital solutions creating an end-to-end, traceable and data-driven trail of how public funds are spent on organizational asset. It was further found that every asset purchased generates a digital record from the initial

requisition stage up to delivery and payment. This allows management to know exactly what was bought, when it was delivered, who approved it, and its current location. This supports the argument by Jana et al (2021) who reported that better monitoring ensures that assets are recorded immediately upon receipt, making it easier to track depreciation, schedule preventative maintenance and efficiently allocate resources across academic departments.

For institutions like the College of Business Education and the Dar es Salaam Institute of Technology, the digital systems influence public asset management practice as follows. With regard to e-procurement systems such as NeST, the adoption of NeST mandates the digitization of tendering, bidding and contract management for the enhancement of digital transformation with asset management practice; it ensures that assets are acquired transparently at the best value and from vetted vendors. By standardizing specifications electronically, CBE and DIT can better align physical asset acquisitions with their strategic educational and operational needs.

Generally, respondents in Tanzanian higher learning institutions (such as CBE and DIT) broadly agree that e-procurement systems positively influence public asset management practice. However, their feedback highlights a distinct divide between theoretical benefits and practical implementation challenges. The respondents noted that electronic systems reduce corruption, favoritism and manipulation of asset records; digital tracking minimizes manual errors in asset logging, leading to a much higher precision of institutional inventory and automated processes such as e-tendering, e-evaluation, and e-payment accelerate the acquisition of goods and streamline asset tracking. Moreover, the challenges include users frequently citing network downtime, server instability and slow system performance as major bottlenecks; a lack of regular training and low ICT competency among staff members often leads to hesitation and underutilization of the platforms; and while respondents heavily utilize systems for tendering, they report low compliance and resistance when it comes to electronic contract and asset lifecycle management.

Moreover, an (R^2) of (0.634) or (63.4%) means that the independent variables explain (63.4%) of the variation in public asset management practice at the College of Business Education (CBE) and Dar es Salaam Institute of Technology (DIT). The remaining (36.6%) is due to other unmeasured factors or errors. This R^2 of (0.634) is generally considered strong or a moderate-to-substantial fit. It indicates that the chosen predictor variables (e.g., procurement specifications, resource allocation, staff competence) have a solid and meaningful influence on asset management practice outcomes. The remaining (36.6%) of variance represents the influence of variables not included in the specific regression model (such as localized macroeconomic conditions, specific organizational culture or unique public sector policies).

Table 3.2 illustrates.

Table 3.2: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig
1	.797 ^a	.634	.612	1.045	0.000

Based on the statistical results provided ($R^2 = 0.634$) and ($p = 0.000$), digital systems exert a statistically significant and strong positive influence on public asset management practices at

the College of Business Education (CBE) and the Dar es Salaam Institute of Technology (DIT). The results strongly align with classic studies on public sector digitalization (e.g., frameworks by the World Bank (2022)) and previous research consistently shows that digital tools reduce human error, speed up asset tracking and automate depreciation calculations. While broader literature often highlights that digital systems fail in public sectors due to low digital literacy, the strong positive fit suggests that because CBE and DIT are academic and technology-focused institutions, they possess the baseline digital literacy required to bypass initial implementation bottlenecks.

CBE and DIT should integrate asset management modules directly into the institutions' broader Enterprise Resource Planning (ERP) systems and the central government's financial management systems by investing in continuous training for estate officers, procurement teams and auditors to maintain system integrity. Moreover, the management must recognize that technology alone is not a silver bullet. Complementary policies regarding institutional accountability, clear asset disposal guidelines and anti-corruption controls must be strengthened to address the remaining variance.

Conclusion

It is concluded that the integration of e-procurement systems (such as NeST and TIPMS) into public higher learning institutions like the College of Business Education (CBE) and the Dar es Salaam Institute of Technology (DIT) has significantly improved institutional performance, though significant infrastructural and capacity barriers remain.

Implementing the national e-procurement system (TANePS) expedites the procurement process and provides real-time tracking of assets, significantly reducing manual errors and cycle times. This enhances efficiency and tracking. Also, e-procurement curtails opportunities for corruption and unauthorized purchasing by centralizing records, ensuring compliance with Public Procurement Regulatory Authority (PPRA) guidelines. This enhances transparency and accountability. Yet, while e-tendering is strong, e-contract administration and comprehensive asset lifecycle tracking remain underutilized. Both institutions experience bottlenecks due to unstable internet and low technical readiness among some staff.

Recommendations

To optimize public asset management practice at Tanzanian higher learning institutions like the College of Business Education (CBE) and the Dar es Salaam Institute of Technology (DIT), it is highly recommended to align digital procurement (NeST) while prioritizing capacity building, IT infrastructure and robust data security.

The management should mandate regular, practical training on TANePS and digital asset management for procurement and finance staff at both CBE and DIT to improve system adoption. Also, both institutions must invest in resilient ICT infrastructure, including dedicated high-speed internet connections and uninterrupted power supply (UPS) backups, to prevent system downtime. Additionally, there is a need to integrate the e-procurement platform with the institutions' internal accounting and asset management software to create a seamless end-to-end lifecycle from initial requisition and purchasing to final asset disposal. Moreover, the study was localized to specific urban area of Dar es Salaam, making it difficult to extrapolate findings to HLIs operating in other regions.

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