



Print ISSN: 1738-3110 / Online ISSN 2093-7717
 JDS website: <http://accesson.kr/jds>
<http://doi.org/10.15722/jds.23.04.202504.91>

Electronic Procurement to Improve Sustainability and Digital Transformation in Government Procurement

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Received: January 11, 2025. Revised: February 12, 2025. Accepted: April 05, 2025.

Abstract

Purpose: This study aims to explore the role of electronic procurement (e-procurement) in improving sustainability and digital transformation in government procurement, focusing on the Bureau of Procurement of Goods/Services in East Java Province, Indonesia. **Research design, data, and methodology:** This study uses a qualitative method with a case study approach. Data were collected through semi-structured interviews, participatory observations, and analysis of documents related to electronic procurement systems. The sampling strategy uses purposive sampling with the recommendation of gatekeepers to select as many as 10 informants from various roles related to e-procurement. **Results:** This study identifies some of the main challenges of implementing e-procurement including the costs associated with developing technological infrastructure, lack of alignment of social and digital skills, resistance to change, and access gaps by small businesses. However, the implementation of e-procurement holistically can balance technology and people to lower costs, increase the adoption of digital technology, and manage change management to address gaps. These findings prove that successful digital transformation can improve government procurement efficiency, transparency, and accountability. **Conclusion:** E-procurement promotes sustainability and drives digital transformation by increasing efficiency, transparency, and accountability by addressing challenges through an integrated approach that balances technological and social aspects.

Keywords: Electronic Procurement, Sustainability, Digital Transformation, Government Efficiency, Public Procurement.

JEL Classification Code: H57, O33, Q56, M15

1. Introduction

Electronic procurement (e-procurement) is a process that uses digital technology to improve efficiency, transparency, and accuracy at every stage. It utilizes digital technology in executing procurement (Luo et al., 2023), transitions

traditional procurement to electronic procurement through the integration of technology (Yadav & Prakash Singh, 2022), and enhances the transparency of procurement (Raya & González-Sánchez, 2020). Innovations in electronic procurement help lower cost stickiness by improving the quality of internal control and increasing efficiency in resource adjustments (Du et al., 2024).

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The digital platform is an electronic catalog to improve procurement, encompassing planning, supplier selection, contracts, and the goods and services users utilize. Digital platforms influence supply chain performance in executing electronic procurement and adopting and implementing e-procurement (Hallikas et al., 2021). The use of e-procurement entails utilizing various electronic systems, including electronic marketplaces (e-marketplace), electronic auctions (e-auction), electronic catalogs (e-catalog) (Motaung & Sifolo, 2023), advance procurement digitalization, atau procurement 4.0, purchasing 4.0 atau digital procurement (Herold et al., 2023). Governments worldwide have implemented e-procurement to increase transparency and accountability while encouraging economic efficiency and competitiveness in government procurement (Puspita & Gultom, 2022).

Sustainability transformation in e-procurement improves the efficiency of resource use, accountability, and data availability for procurement decision-making. Sustainability can provide more accurate data for supplier change decision-making, digital platform integration, and better display monitoring data (Alabdali & Salam, 2022). The transformation of electronic procurement requires data processing with big data analytics techniques by utilizing internal and external data (Hallikas et al., 2021). Procurement transformation increases accountability, transparency, security, and efficiency using blockchain for supply chain and electronic contract management (Herold et al., 2023). The e-procurement system improves performance with automation and digital audit records.

Digital transformation employs technology for a more integrated and data-driven approach to procurement management. This transformation relies on information, communication, computing, and digital integration technologies (Herold et al., 2023). Digital transformation is crucial for achieving more transparent procurement transactions, fostering openness in the procurement process, and enhancing the relationship between buyers and suppliers (Alabdali & Salam, 2022). The role of digital transformation is to adopt electronic procurement to effectively implement digitalization practices, allowing organizations to capitalize on various opportunities and navigate potential obstacles, particularly in the construction sector (Luo et al., 2023). Digital transformation leverages technology to enhance performance by optimizing business processes in organizations, particularly in procurement (Gong & Ribiere, 2021). In procurement digitalization, digital transformation involves utilizing information systems to enhance the capabilities of procurement organizations, enabling them to achieve cost savings, improve efficiency, and optimize business processes (Matarazzo et al., 2021).

E-procurement significantly impacts government procurement efficiency by reducing administrative costs and

accelerating procurement. It also helps decrease costs within the procurement supply chain (Matarazzo et al., 2021), lower costs, and increase profits (Matarazzo et al., 2021). Using e-procurement can simplify the purchasing and payment process so that administrative costs will be further reduced, increasing flexibility, speed, and agility in the procurement process (Matarazzo et al., 2021). It is hoped that e-procurement can optimize efficiency and access to information, reduce administrative costs, and increase competition in the procurement process (Matarazzo et al., 2021).

However, using e-procurement has disadvantages, such as the high cost of preparing the necessary technological infrastructure, a lack of digital skills, and limited technological access. The establishment and development of e-procurement require significant costs, time, and the involvement of numerous human resources (Luo et al., 2023), costs for selecting suppliers, developing security systems, and ensuring information availability (Yadav & Prakash Singh, 2022). There are concerns about the use of electronic procurement in the security aspect of information systems and a lack of skills in using the system (Motaung & Sifolo, 2023). The object of e-procurement brings new challenges in cost analysis because it has a unique cost structure for material goods and digital components such as software (Bodendorf et al., 2022). Broader efforts are needed to improve digital infrastructure, especially in organizations that have a large area and need to improve the maturity of their digital infrastructure (Du et al., 2024).

In sustainability transformation, an imbalance exists between technological and social factors, such as user resistance or insufficient training, which can impede effective implementation. Sustainability necessitates recognizing the importance of integrating social factors with technology to assess the risks associated with collecting services through online platforms in procurement (Lee et al., 2022). Superior procurement performance can be attained if the two components enhance organizational effectiveness (Tortorella et al., 2021). Human resource management within a sociotechnical system aims to foster employee commitment, continuous learning, and performance feedback, enabling technology to benefit the organization (Dorval & Jobin, 2020).

The limited capacity of organizations to embrace digital technology results in a deficiency of strategies for change and the adaptation of workplace culture. When implementing digital transformation, organizational readiness is shaped by organizational culture, resource availability, change management capabilities, and employee attitudes toward innovation and adjustments to business processes within the organization (Ahmed et al., 2024). The COVID-19 pandemic offers a significant lesson in the procurement process: always consider the total cost and the

importance of collaborating with suppliers and developing new sources of supply to minimize supply chain risks (Hoek, 2020). Digital transformation is shaped by change management capabilities, organizational opportunities for integrating technology, strategic technology alignment with organizational goals, and the skills required for employees and supply chain partners (Machado et al., 2021).

Additionally, e-procurement can increase the disparity in procurement competition among small business entities. Effectively managing the procurement system electronically poses a challenge in optimizing the supply chain (Motaung & Sifolo, 2023). Optimizing costs in electronic procurement, when integrated with other platforms, can address the challenges presented by traditional supply chains (Yadav & Prakash Singh, 2022). New challenges for purchasing and supply management (PSM) include managing electronic procurement items and addressing information imbalances between buyers and suppliers (Bodendorf et al., 2022). The use of digital devices, particularly in procurement, stems from the polarization among users with access to and the skills for developing digital technology alongside the need for education in attention and information management to bridge the digital divide (Iivari et al., 2020). The digital divide is a technical phenomenon that must be addressed seriously through policies, education, training, and design adjustments to ensure service users gain the knowledge needed to reduce the gap (Vassilakopoulou & Hustad, 2023).

2. Literature Review

Several studies have examined the implementation of e-procurement to increase efficiency and transparency in procurement (Changalima et al., 2020). However, some e-procurement research is still limited to the scope or region with advances in digital technology (Yadav & Prakash Singh, 2022). Meanwhile, local governments in developing countries like Indonesia have not had in-depth studies, significantly to improve sustainability and digital transformation. This research contributes to the application of e-procurement in local governments to the readiness of human resources, technology, and its challenges.

The implementation of e-procurement in developed countries has shown significant procurement improvements (Herold et al., 2023). In some European countries, e-procurement reduces corruption and improves public procurement efficiency (Jiménez et al., 2022). In Singapore and South Korea, the success of e-procurement implementation is influenced by good government policies and the strengthening of digital procurement infrastructure (Alabdali & Salam, 2022). Meanwhile, in developing countries such as India, Pakistan, and Bangladesh, the digital divide and limited access to digital infrastructure are

still obstacles to the successful implementation of digital transformation (Sharma et al., 2021).

This research analyzes e-procurement in local governments and provides a perspective on developing and developed countries globally to find out the challenges and digitalization of public procurement. For an in-depth analysis, several relevant theories are used, including the Technology Acceptance Model (TAM), Sociotechnical Systems Theory (STS), Change Management Theory (CMT), and Digital Divide Theory (DDT).

The Technology Acceptance Model (TAM) explains that the success of e-procurement implementation is greatly influenced by the perceived benefits of technology in improving performance and productivity, along with the perception of ease of use of e-procurement (Ajzen, 2020). The perceived benefits of using e-procurement are influenced by the extent to which users have confidence that this system will increase efficiency and transparency. Meanwhile, the perception of ease of use of e-procurement is based on the assumption that there is ease of use of the system without requiring special skills. Several studies suggest that the higher the assumption of benefits in e-procurement, the greater the likelihood of adoption (Wijaya, 2022). E-procurement and supply chain innovation also offer the flexibility to adapt to market changes and improve supply chain performance, especially for Small and Medium Enterprises (SMEs) (Wijaya, 2022). Although e-procurement systems offer increased efficiency and ease of adaptation, barriers often stem from psychological and technical factors such as perceived difficulty in use, lack of training, and unwillingness to change (Luo et al., 2023). Among the benefits of digital transformation are increased productivity and competitiveness, increased access to services, and higher satisfaction with the services provided (Llopis-Albert et al., 2021). TAM helps understand the human behavioral factors influencing procurement technology's potential acceptance and rejection (Motaung & Sifolo, 2023). So that e-procurement can be adequately implemented in the public sector, the government must ensure that the psychological aspects that affect users are not only technical factors in the system.

According to Sociotechnical Systems Theory (STS), the success of e-procurement in supporting sustainability transformation is highly dependent on the simultaneous development of technological and social components, including skills, work culture, and user acceptance (Imran et al., 2021). In e-procurement, digital systems will not run well if they are not supported by a balance of social aspects and work culture that supports change. The success of e-procurement in supporting sustainability transformation depends on balancing the technological components, such as data analytics and digital innovation, with social factors, including mindsets, organizational culture, and employee

engagement (Hübel & Schaltegger, 2022). Although the system developed has advantages and sophistication, if the user is not trained and used to it, it will experience difficulties and obstacles to use optimally. The success of e-procurement in supporting sustainability transformation depends on balancing the technological components, such as data analytics and digital innovation, with social factors, including mindsets, organizational culture, and employee engagement (Lee et al., 2022). STS emphasizes the integration of human social aspects with technical aspects of the organization to identify and manage factors that impact challenges in the work system (Kratzke et al., 2022). This STS provides an important overview that the e-procurement system must be developed without overriding social and technical aspects in a balanced manner so that changes can be carried out effectively.

Meanwhile, the success of Change Management Theory (CMT) technology adaptability depends on a clear vision, leader involvement, adequate training, and strategies to overcome resistance, ensuring the comprehensive adoption of new cultures in the transformation of e-procurement (Ahmed et al., 2024). Digital transformation drives organizations to enhance competitiveness by fostering innovation, implementing procurement efficiency, and utilizing advanced e-procurement systems (Alabdali & Salam, 2022). CMT outlines the organizational change process, emphasizing the importance of preparing for change, executing change, and embedding change within the organizational culture (Islam et al., 2020). CMT also assists organizations in understanding, planning, and implementing change effectively by focusing on structural processes and employees' emotional responses (Shang et al., 2021).

Likewise, the Digital Divide Theory (DDT) emphasizes that adopting technology must be paired with efforts to

bridge the digital divide through training, infrastructure development, and inclusive policies so that the positive impact of technology can be experienced equally (Reddick et al., 2020). The digital divide is a sociotechnical phenomenon that mirrors socio-economic inequality in the real world, impacts the ability to access and use technology, and is shaped by the specific conditions of infrastructure (Vassilakopoulou & Hustad, 2023). The digital divide refers to differences in access to and affordability of broadband technology, influenced by geographical factors, profit-driven discrimination, technology implementation costs, market competition, and socio-economic conditions (Reddick et al., 2020). Additionally, the digital divide highlights the disparities in access to internet-based information, particularly in underserved rural areas. This issue is further worsened by a lack of understanding regarding adopting and using information and communication technologies (ICTs) despite various initiatives, such as establishing public access centers (Reddick et al., 2020).

E-procurement is expected to automate manual processes such as document creation, bid evaluation, and reporting. This automation reduces administrative time and costs, speeding up the procurement of goods and services. Digital systems provide a track record of procurement activities that can be audited in real time, which minimizes opportunities for corruption and enhances accountability for the use of public funds. Electronic procurement platforms document the digital footprint of the procurement process, facilitating easier audits (Luo et al., 2023). This article examines the role of e-procurement in enhancing sustainability and digital transformation within government procurement at the East Java Provincial Government.

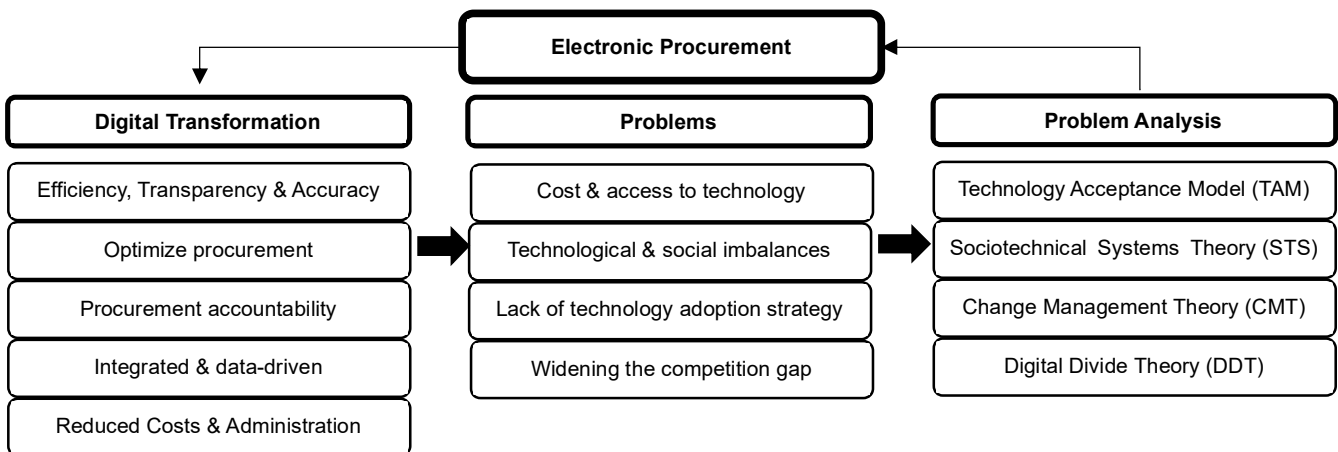


Figure 1: Research Model of Electronic Procurement

Note: Adopted from TAM from Fred D. Davis, 1986 (Ajzen, 2020) STS from Eric Trist and Ken Bamforth, 1951 (Imran et al., 2021) CMT from Kurt Lewin, 1947 (Ahmed et al., 2024) and DDT from Jan van Dijk, 1999 (Reddick et al., 2020).

3. Research Methods and Materials

The research design in this study employs a qualitative research method with a case study approach to thoroughly explore the context, dynamics, and challenges of implementing digital procurement at the Bureau of Procurement for Goods and Services (PBJ Bureau) in East Java Province, Indonesia. This qualitative research seeks to describe and interpret experiences, gather new insights, and enhance understanding without prior assumptions (Reddick et al., 2020). A case study approach that explores and deepens our understanding of the digital divide through a technology-based learning process (Choudrie et al., 2022). Additionally, case studies in research collect specific yet compelling qualitative data, which is increasingly available for studies on technological innovation (Twis et al., 2020).

The PBJ Bureau in East Java Province, Indonesia, was established following Governor Regulation Number 44 of 2019, which pertains to the Position, Organizational Structure, Description of Duties and Functions, and Work Procedures of the Regional Secretariat of East Java Province. Its vision is to achieve transparency, accountability, and credibility (<https://tropbj.jatimprov.go.id/web/index.php#hero>). This research focuses on the procurement of goods and services, which aligns with the PBJ Bureau's mission. The Bureau aims to ensure that procuring government goods and services is efficient, effective, transparent, open, competitive, fair, non-discriminatory, and accountable.

The population in this study includes all employees and stakeholders in the PBJ Bureau who are engaged in the procurement of goods and services. Identifying appropriate populations promotes the use of digital solutions that are accessible to the right users and increases the benefits for each individual (Martins Van Jaarsveld, 2020). The number of employees at the PBJ Bureau is 96 people, and micro, small, and medium enterprises (MSMEs) who use e-procurement are 25 people. So the total population is 121 people. Meanwhile, the sample uses a purposive sampling approach that targets employees who use electronic procurement systems, especially the Procurement General Plan Information System (SIRUP), Electronic Procurement System (SPSE), Electronic Catalog (E-Catalog), Online Store, and Goods/Services Procurement Service Application (Steel Apple). This purposive sampling is enhanced by snowball sampling, which is done through the recommendation of the initial purposive sample (Reddick et al., 2020). Gatekeepers facilitate access for those with institutional memory and knowledge of the organization to understand ongoing processes and practices (Richardson et al., 2021). Gatekeepers provided recommendations to 10 relevant informants, namely the procurement implementation sub-coordinator, the monitoring and

evaluation sub-coordinator, the Electronic Procurement System (SPSE) sub-coordinator, the information system development sub-coordinator, and the human resource development sub-coordinator at the East Java Provincial PBJ Bureau. In addition, it includes two electronic procurement implementers who evaluate the e-procurement system and three representatives from business entities of micro, small, and medium enterprises (MSMEs) who use e-procurement for procurement. So, of the 96 employees of the PBJ Bureau, seven people are represented as informants, and of 25 MSMEs, three are represented as informants.

Qualitative research instruments were carried out using semi-structured interviews, supporting documents in electronic procurement documentation, and participatory observation with direct observation of electronic procurement systems in the workplace. In-depth semi-structured interviews are preferred because they generate significant narratives, turn questions about specific topics into stories, and seek relevant information to uncover the informant's experience (Richardson et al., 2021). Semi-structured interviews to dig deeply into information from informants. This approach allows flexibility and enables the interviewer to develop relevant questions according to the context that arises during the interview. Observation of digital data compared to a control group using a tendency score (Du et al., 2024). Directly observe the procurement process carried out digitally by the informant, recording the use of the electronic procurement system (Viergever, 2019).

The procedures outlined in this study are divided into several stages: preparation, data collection, data analysis, and report preparation. The first stage involves the creation of interview guides and observation instruments. These interview guidelines assist researchers in conducting quality interviews in qualitative research and aim to uncover individual reconstructions of perceived experiences (Mahat-Shamir et al., 2021). The interview questions in this study are prepared based on four theories used, namely the Technology Acceptance Model (TAM), Sociotechnical Systems Theory (STS), Change Management Theory (CMT), and Digital Divide Theory (DDT). The questions will be prepared through a literature review of previous research, which also uses this theory in technology research and digital transformation in various contexts, specifically in procurement. Next, apply for a research permit from the Head of the PBJ Bureau and identify the informant with the help of a gatekeeper. Informants are identified through purposive sampling techniques that understand social reality and are adapted to the context that affects the research's inputs, processes, and results (Mahat-Shamir et al., 2021).

The second stage of data collection involves conducting in-depth interviews with informants. This interview identifies barriers that need to be discussed with stakeholders to provide a comprehensive overview of the service business

process and technology development (Azodo et al., 2020). Before the conduct of the interview, the researcher explained the purpose, benefits, and how the information conveyed would be analyzed. This aims to provide a more specific picture to the informants so that the answers to the questions presented do not go out of the research context. The informant was also allowed to ask questions before the interview was conducted. The interview was conducted for 40 to 60 minutes and recorded with the approval of the informant. In addition to interviews, participatory observation was also carried out, aiming to explore the working mechanism of electronic systems in depth, specifically focusing on the behavior, interaction, and social context of the subjects being studied (Zhu et al., 2024). Then, the procurement implementation report will be analyzed electronically. Document analysis is carried out to review and evaluate documents relevant to the research context (Zhu et al., 2024). The third stage involves data analysts who use the Nvivo 15 application to analyze data by identifying patterns, themes, and challenges in implementing electronic procurement. Nvivo is an application that provides coding to analyze themes in interview transcripts and other data analysis data (Azodo et al., 2020). Data triangulation involves comparing the results of interviews, documents, and observations to ensure the validity and realism of the findings. This method also helps to ensure the credibility and reliability of the research collected through interviews and the validity and credibility of the research (Alam et al., 2023).

In the fourth stage, the study results are compiled in a report describing the findings, analysis, and recommendations to improve the use of electronic procurement. The study's results will show trends, contribute to the literature, and confirm, highlighting the importance of the results (Samagaio et al., 2024). Then, recommendations are given as a strategic guide to overcome challenges and get opportunities to integrate technology in obtaining digital transformation (Samagaio et al., 2024).

4. Results and Discussion

Data collection through interviews with informants was conducted to explore the role of electronic procurement in enhancing sustainability and digital transformation in government procurement within the East Java Provincial Government until data saturation was reached.

In qualitative research, saturation is usually achieved through sample size interviews ranging from 9 to 17 or group discussions of 4 to 8 participants for a homogeneous population with a specific goal (Hennink & Kaiser, 2022). This study involved 10 informants. It explores four theories related to electronic procurement, specifically the Technology Acceptance Model (TAM) (Ajzen, 2020);

Sociotechnical Systems Theory (STS) (Imran et al., 2021); Change Management Theory (CMT) (Ahmed et al., 2024); and Digital Divide Theory (DDT) (Reddick et al., 2020). This theoretical approach allows more systematic research to group empirical findings into theoretical concepts to increase clarity in interpretation.

The main points of the interview questions posed to the informant regarding digital transformation and its challenges depicted in Figure 1 are listed in the following Table 1:

Table 1: List of Interview Questions Based on Theory

No	Interview Questions	Theoretical Basis
1	What are the cost requirements for the manufacture and development of electronic procurement and its utilization?	TAM (Wijaya, 2022) and (Motaung & Sifolo, 2023)
2	How do technological developments align with social aspects and skills in their use?	STS (Hübel & Schaltegger, 2022) and (Lee et al., 2022)
3	What is the strategy for implementing system changes and collaborating with relevant stakeholders?	CMT (Ahmed et al., 2024) and (Islam et al., 2020)
4	How is competition in business actors affected by system changes?	DDT (Vassilakopoulou & Hustad, 2023)

Interviews are conducted with recommended informants. There are 10 informants assigned codes, namely informant 1 (A1) through informant 10 (A10). The informant code indicates that the informant provides the information data according to their assigned code. The results obtained from collecting data through interviews are:

Table 2: Interview Results, Theme and Coding

No	Analysis	Interview results, theme determination, and coding
1	TAM	Theme 1: Cost needs Code: Large budget (A2, A8), system manufacturing (A1), cooperation (A3, A4), electronic procurement (A5, A7), East Java (A6), system user (A10) Theme 2: System Utilization Code: System change (A7, A9), lack of understanding (A2, A5), need training (A4), benefits (A6, A8, A10), improve performance (A1, A3), ease (A3, A6, A5)
2	STS	Theme 1: Technology and Society Codes: Inequality (A3, A7), emerging technology (A1, A2), socially disadvantaged (A4, A6), slow adoption (A8, A9, A10) Theme 2: Skills Code: need to improve (A3, A5), system training (A1, A4), follow changes (A7, A8, A9), system users (A2, A6), electronic system work culture (A2, A10)

No	Analysis	Interview results, theme determination, and coding
3	CMT	Theme 1: Change strategy Code: Sustainability (A1, A2, A5), Transformation roadmap (A3, A4), work culture (A1, A9), procurement ecosystem (A7, A10) Theme 2: Collaboration Code: employee involvement (A3, A5), Adoption of new culture (A1, A9), shared utilization (A4, A6, A7)
4	DDT	Theme: Business Competition Codes: Small business (A1, A3), unfair competition (A2, A6), resources (A5, A7), partisanship (A8, A9)

According to the theme and code from the interview results, the analysis identified several main aspects that affect the implementation of e-procurement. Each theme is explicitly grouped in a theoretical framework to increase its theoretical relevance further. The following is an analysis according to each theory, namely the Technology Acceptance Model (TAM), Sociotechnical Systems Theory (STS), Change Management Theory (CMT), and Digital Divide Theory (DDT).

4.1. Technology Acceptance Model (TAM)

The results of the interview, after the determination of the theme and coding, showed that, according to TAM table 2, there is a need for a substantial budget allocation for the creation and development of the procurement system at the Goods/Services Procurement Policy Institute (LKPP), especially the Inaproc version 6 electronic catalog in collaboration with PT Telkom Indonesia. Meanwhile, the use of electronic procurement by the East Java Provincial Government is subject to a non-tax state revenue fee (PNBP) for transactions involving non-small business actors. Although systems are often developed, not all electronics procurement employees have received the necessary training to operate the technology. Nevertheless, users believe that changes in this system will result in benefits for improved performance and productivity procurement.

Based on TAM's perspective, adopting e-procurement is influenced by two things, namely the perception of ease in using and the perception of the benefits obtained. The study results show that although e-procurement can increase efficiency and transparency, there is still a lot of concern about the availability of budgets and the development of digital systems and training development. As informants (A2, A8) revealed a large cost requirement for the development and maintenance of the system, the other informants (A4) still have difficulty using it due to lack of training, and (A2, A5) do not have enough understanding to use the system optimally. As stated by the informant (A2),

"The available government budget is not enough to develop an e-procurement system so that the procurement process cannot be carried out entirely using the information system." This is in line with TAM's view, which is that user adoption is influenced by the balance between the complexity of the system and the benefits that can be felt (Ajzen, 2020).

Problem-solving with structured training programs with easy-to-use features can increase the adoption of e-procurement systems. As the informant (A4) said, *"I am often confused by the changes in the e-procurement system, but with the training provided, it can facilitate the implementation of procurement in the system."*

4.2. Sociotechnical Systems Theory (STS)

There is an imbalance in technological and social aspects in line with STS, as mentioned in Table 2. In particular, government procurement users are comfortable using the old system, e-catalog version 5, and face obstacles in transitioning to the latest system, e-catalog version 6, due to the need for significant changes, including payment mechanisms. Not all employees receive training, leading to a skills gap among staff related to electronic procurement. System users in local governments coordinate with each other to overcome social constraints, provide training, and foster a work culture around electronic procurement. The informant (A3) said, *"I am used to using the old system. The new system has many features, but it is too difficult to use without adequate training"*.

These findings also show that there is an inequality in technological advances and social aspects in procurement, which is a major problem in the STS approach. Among them, the informant (A3, A7) said that there were obstacles to using the catalog in the latest version, namely version 6, because it was unusual with the new system and resistant to change. The lack of training also contributes to the gap, so there is a disparity in digital adoption among procurement officers (A8, A9, A10). The informant (A7) said, *"Some employees do not want to use the new system because they tend to be comfortable with the old system that has been used for a long time."*

Following the STS concept, it is necessary to improve the balance between the use of digitalization and the readiness of users and the culture of the organization (Hübel & Schaltegger, 2022). So, there needs to be collaboration from the beginning between procurement parties and technology developers to fill the digital transformation gap in procurement and periodically develop employee competencies with a balance between technology development and social readiness for employees and application users to ensure that system adoption can be carried out correctly.

4.3. Change Management Theory (CMT)

The strategy for implementing system changes based on CMT, as mentioned in Table 2, is currently lacking because there is no clear development strategy or roadmap for digital procurement transformation, nor is there an employee work culture adjustment program in the mentoring ecosystem. A more structured approach for employees is needed to reduce resistance to change, including engaging them from the beginning, ensuring effective communication, and periodically improving their competence in digital procurement.

As with the concept of CMT, for technological transformation to run well, it is necessary to have a clear vision accompanied by a structured change strategy. However, the results of digital procurement research at the East Java Provincial Goods/Services Procurement Bureau do not have a clear roadmap and implementation strategy. This was conveyed by the informant (A1, A2, A5) that there is no clear digital transformation roadmap, and there is also a need for leadership involvement to direct procurement actors and reduce resistance. As stated by the informant (A1), namely *"I still do not know how to develop the system in the future because there is still no clear direction about the long-term plan"*. In addition, it is also necessary to involve all stakeholders from the beginning of the transformation process to facilitate the adoption and transition of digital procurement (A7, A10). As the informant (A9) also revealed, *"I was not involved in the development of the system. I was only asked to use a system that had changed"*. This is in line with the CMT that the need to strengthen structured change management (Ahmed et al., 2024). By developing strategic roadmaps and building a culture of readiness for change, organizations can improve sustainability in e-procurement development.

4.4. Digital Divide Theory (DDT)

According to DDT, as mentioned in Table 2, there is unfair competition for small business actors because they face challenges to compete with medium and large businesses and face difficulties in accessing and managing digital procurement platforms due to limited resources. Support for small business actors is significant as a form of advocacy and empowerment to improve their access and ability to compete.

The digital divide in small business actors aligns with the DDT concept. The informant (A1, A3) said that small businesses are experiencing obstacles in competing with large business actors due to limitations and lagging in digital literacy, resources, and access to the use of technology. Another informant (A2, A6) stated that large companies with more adequate technological capabilities will find it

easier to utilize e-procurement platforms. The informant (A6) also said that *"we as small business actors often experience obstacles in competing with large companies because we have better access and technological capabilities."* With this gap, additional training and alignment are needed for small businesses to accelerate adaptation and use e-procurement independently. As the informant (A8) revealed, *"Small business actors do not know how this system is used properly, so they often lose in the procurement process."*

The concept of DDT contributes to factors related to social and economic aspects in the adoption of the use of technology (Reddick et al., 2020). So, the government needs to pay more attention to small business actors to provide digital literacy training programs, capital assistance, and regulations that support and empower small businesses in public procurement.

4.5. Synthesis of Findings and Contributions

The results of the observations conducted in this study also show obstacles in operating digital infrastructure because unstable systems often experience technical problems during periods of high usage, so it is necessary to develop a more reliable system. Not all employees are proficient in using the digital procurement catalog version 6. Training on the use of the system is essential for users to understand feature changes and manage their challenges effectively. They are confident that the system change will improve procurement performance. Lack of communication and coordination between organizational units tends to address problems in the procurement system without consulting other relevant units, leading to delays in resolving the problem of using digital procurement. Support is also inadequate for small business owners in utilizing digital procurement. Small business operators face challenges in keeping up with the latest changes in procurement policies and systems, resulting in a loss of access to compete in the e-procurement market.

Based on the performance report's documentation results, the electronic procedure has not been effectively utilized, as users continue to rely on the manual procurement method and do not fully engage with electronic procurement. The training document emphasizes that ongoing training is essential to stay updated on developments in the procurement system, particularly for users who lack technological understanding, to minimize discrepancies in digital procurement. Medium and large enterprises tend to adjust more easily to procurement system changes than small businesses, which encounter resource and access limitations. Thus, support is vital for small businesses. Findings from interviews, observations, and documentation highlight similarities and consistencies in the data, ensuring that the

collected information analyzed through triangulation meets both validity and factual accuracy (Alam et al., 2023).

Based on the findings that have been explained, several theories, namely Technology Acceptance Model (TAM), Sociotechnical Systems Theory (STS), Change Management Theory (CMT), and Digital Divide Theory (DDT), can optimally encourage e-procurement to become sustainable and achieve digital transformation as illustrated in the following figure:

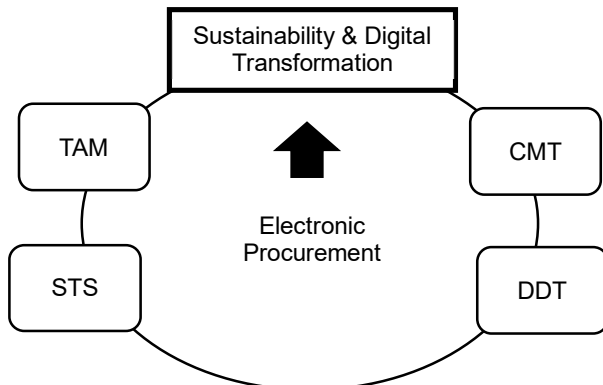


Figure 2: Electronic Procurement to Enhance Sustainability and Digital Transformation

The findings of this study fill the gap in electronic procurement research concerning sustainability and digital transformation, particularly the substantial costs linked to infrastructure preparation (McMahon & Akçayır, 2022), lack of digital skills (Motaung & Sifolo, 2023), and challenges related to acquiring technology (Du et al., 2024) due to constraints resources (Luo et al., 2023). There remains a lack of comprehensive training programs for all users (Vassilakopoulou & Hustad, 2023) and the gap in understanding and access to technology among small business participants (Reddick et al., 2020). Despite the obstacles, they are confident that using electronic procurement will yield benefits (A6, A8, A10), enhance performance (A1, A3), and offer convenience (A3, A6, A5) in government procurement. This impacts the success of electronic procurement implementation by increasing Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) (Ajzen, 2020) based on TAM.

The imbalance between technology and social aspects that hinder sustainability transformation arises from a lack of collaboration in technology development (Tortorella et al., 2021), communication (Dorval & Jobin, 2020), and adjustment of work culture in procurement organizations (Imran et al., 2021). Balancing the social aspect in response to technological developments involves coordinating among system users in local governments to address social obstacles (A7, A8, A9), provide training (A1, A4), and foster a work culture of electronic procurement (A2, A10). This approach

is anticipated to support sustainability and enhance monitoring and efficiency in achieving the goal of balancing the utilized systems (Schleiffer et al., 2022), improving effectiveness and efficiency among stakeholders (Vogler et al., 2021) to achieve sustainability transformation in electronic procurement (Imran et al., 2021) Based on STS.

Rapid system change implementation without a clear digital transformation roadmap and strategies to address resistance to change resulting from insufficient strategic planning (Machado et al., 2021) and the management's dedication to systematically prioritizing digital transformation (Dorval & Jobin, 2020). Creating a transformation roadmap and engaging employees is essential to achieve sustainable change, enabling them to adopt a new culture collectively. This approach can enhance effectiveness and efficiency among the involved parties (Vogler et al., 2021), in the advancement of digital technology (Zhou et al., 2018), to enhance the performance of digital technology in the procurement process (Herold et al., 2023). So that organizations can adapt and adopt digital technologies based on the concept of CMT (Ahmed et al., 2024).

Small business owners struggle to access digital procurement platforms (Reddick et al., 2020) due to limited technology and digital literacy (Vassilakopoulou & Hustad, 2023). In addition, limited resources and competitive ability further widen the gap. It is necessary to be on the side of small business actors (A8, A9), providing direct mentoring and training (Frans & Pather, 2022). Cooperation with supplier providers is required to achieve efficiencies in the procurement process (Schleiffer et al., 2022), training, provision of infrastructure, and inclusive policies to address gaps (Reddick et al., 2020) based on DDT.

Broadly speaking, the results of this study will lead to the main point, namely the implementation of e-procurement in government agencies, which is that there needs to be a more holistic approach by balancing factors between technology and humans. Following several theories, TAM provides a perception of the need for cost considerations to influence the adoption rate, so a better training and cost management strategy is needed. Meanwhile, STS encourages the readiness of digital technology and its users. Likewise, CMT emphasizes the importance of more structured change management to accommodate adoption and implementation. And DDT addresses the digital divide to provide fairer and more inclusive procurement opportunities. By providing a relationship between the research results and four relevant theories, this research is clearer and more structured in analyzing the challenges and opportunities of adopting e-procurement. Likewise, it is necessary to emphasize the development of strategic interventions to achieve sustainability, digital transformation of procurement, and efficiency of public procurement.

In terms of scalability, this research can be widely used at

the government and industrial levels. Implementation in the government, e-procurement has been proven to increase transparency and efficiency so that it can be applied to a smaller scope, namely districts and cities, as well as to a broader area, namely the central government. In the industrial sector, especially small and medium-sized enterprises, challenges and limitations can be reduced with intensive training and support for the use of technology. The scope can be expanded by integrating technology such as blockchain and artificial intelligence. This research is expected to contribute to policy development and expand the adoption of e-procurement systems in various contexts.

5. Conclusions

Electronic procurement aims to enhance sustainability and digital transformation for effective and efficient operations. It requires perceived ease of use and perceived usefulness, balancing technological and social aspects, creating a clear roadmap and digital transformation strategy, and bridging the gap between supplier partners, particularly for small businesses.

This paper offers recommendations for enhancing infrastructure and training, developing a digital transformation roadmap, mentoring small business participants, and improving communication and collaboration among stakeholders regarding creating and using digital resources procurement.

The theoretical impact of addressing the research gap in the technology acceptance model (TAM) regarding government digital procurement complements the success of sustainability transformation by balancing technology and social adaptation. It is necessary to prepare a change roadmap to manage resistance to digital transformation based on change management theory. Additionally, it is essential to consider the perspective of the digital divide, which can affect competition in government procurement for small business actors.

The practical impact aims to motivate the East Java Provincial Government to enhance the efficiency and sustainability of the procurement process through digital procurement, identify obstacles to implementing digital technology and any resistance from its users, and regularly conduct extensive training for system users and small business participants.

Based on this research, specific recommendations that can be given to the government at several levels are the need to adjust policies on e-procurement that are more flexible and easy to use by considering the readiness of the system, increase the competition of small business actors by providing technical and financial incentives, clarify the roadmap for the implementation of e-procurement in stages

so that it can be maintained, and improve accessible training At any time by utilizing e-learning, video tutorials and utilizing artificial intelligence in the development of e-procurement systems.

Suggestions for future researchers to conduct follow-up studies measuring the impact of digital procurement on cost and time efficiency in government procurement and sustainability innovations in line with the development of digital procurement platforms.

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