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The Effect of Implementing e-Government on the Efficiency of Population Administration Services in Tangerang City

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Article Info	Abstract
	This study investigates the effect of implementing e-Government on the efficiency of population administration services in Tangerang City. The research analyzes how digitalization in public administration has enhanced service delivery, streamlined processes, and improved citizen satisfaction. The results show that e-Government initiatives, such as online service platforms and digital document management, have led to reduced processing times, increased accessibility, and greater convenience for citizens. Additionally, the adoption of e-Government has fostered greater transparency and accountability in government operations. Despite these positive outcomes, the study identifies challenges related to digital literacy, infrastructure, and equitable service delivery, suggesting areas for further improvement. These findings highlight the significant potential of e-Government to enhance public administration but also emphasize the need for continuous refinement and adaptation to address emerging challenges.

INTRODUCTION

The rapid digitalization of public services has transformed the relationship between citizens and government institutions worldwide. In many countries, the introduction of e-Government systems is seen as a vital tool to improve the efficiency, accessibility, and transparency of public services. This shift towards digital platforms not only reduces the administrative burden on government agencies but also enhances the overall service delivery experience for citizens. In Indonesia, particularly in cities like Tangerang, the adoption of e-Government has been a critical component of broader public sector reform efforts aimed at improving governance and reducing bureaucratic inefficiencies. The evolution of e-Government systems in this context highlights their potential to streamline population administration services, which are essential for ensuring the effective management of personal and civic data.

E-Government encompasses a range of initiatives aimed at utilizing technology to enhance the quality and efficiency of public administration. These initiatives include the digitalization of services such as electronic identity cards (e-KTP), online public service applications, and integrated platforms for administrative functions. Studies have demonstrated that e-Government can lead to numerous benefits, including reduced processing times, increased transparency, and better accessibility to services. In Tangerang, the implementation of e-Government systems has resulted

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in notable improvements in the administration of population services, offering faster, more accurate, and user-friendly platforms. The shift from manual, paper-based processes to digital systems in public administration aligns with global trends that emphasize efficiency and citizen-centric governance (Asgarkhani, 2005; Asogwa, 2012).

Despite these advancements, the implementation of e-Government is not without its challenges. One of the most significant barriers to successful digital transformation in public administration is the digital divide, which is evident in both the public's and civil servants' varying levels of digital literacy. In Tangerang, as in many other regions, a lack of infrastructure, inadequate training, and insufficient public awareness have hindered the full realization of the potential benefits of e-Government. Moreover, issues such as data security, system integration, and equitable access to services remain crucial concerns that need to be addressed to ensure the long-term success of e-Government initiatives (Ebrahim & Irani, 2005). Consequently, while e-Government has contributed to increased service delivery efficiency, its full potential has yet to be realized, necessitating a deeper exploration of the underlying challenges and possible solutions.

The primary research question of this study is to explore the effect of e-Government on the efficiency of population administration services in Tangerang City. Specifically, this study aims to evaluate the extent to which e-Government initiatives have improved administrative processes, reduced service delivery times, and increased citizen satisfaction. Prior research has provided valuable insights into the positive effects of digital governance on service efficiency, but studies that focus specifically on population administration in Indonesian cities remain limited. Therefore, this research seeks to contribute to the existing body of literature by examining the tangible benefits and challenges of e-Government in the context of Tangerang's population administration services.

Several studies have examined the role of e-Government in enhancing public sector performance, particularly in terms of efficiency, cost reduction, and service accessibility. For instance, Asgarkhani (2005) and Asogwa (2012) argue that digital solutions in public administration reduce bureaucratic delays and enhance the management of public resources. Additionally, research by Yıldırım and Bostancı (2021) suggests that citizens who engage with e-Government services report higher satisfaction levels due to the reduced time and effort required to access government services. These findings suggest that e-Government has the potential to revolutionize public service delivery, making it more responsive and efficient. However, the successful implementation of these systems is contingent upon addressing several key challenges, including ensuring equitable access, improving digital literacy, and overcoming infrastructure constraints (Ebrahim & Irani, 2005). This study will expand upon these insights by specifically focusing on population administration services, an area that has not been extensively explored in the context of Indonesian cities.

Research on e-Government in the context of developing countries like Indonesia has revealed both opportunities and challenges. While digital systems have the potential to enhance service delivery, they often require significant upfront investments in infrastructure and technology. Moreover, the gap in digital literacy between different segments of the population can limit the ability of citizens to fully engage with e-Government platforms. Omweri (2024) emphasizes that addressing these disparities is crucial to the success of e-Government, particularly in regions with limited access to technology. Additionally, the need for continuous capacity-building among government officials, who must manage and maintain digital systems, is an essential aspect of sustaining e-Government efforts. This study will build on these findings by

examining how these challenges manifest in Tangerang City and how they can be mitigated to improve the efficiency of population administration services.

The gap in the literature regarding the implementation of e-Government in population administration services, particularly in urban Indonesian contexts, underscores the need for further research. While numerous studies have explored the effects of e-Government on public administration in general, few have focused on specific services such as population registration. This research aims to fill this gap by providing an in-depth analysis of the impact of e-Government on the efficiency of population administration services in Tangerang, offering insights that may be applicable to other cities in Indonesia and similar regions globally. Furthermore, the study will examine the role of citizen engagement and digital literacy in shaping the success of these initiatives, contributing to a broader understanding of how e-Government can be optimized for improved service delivery.

The goal of this study is to assess the effect of e-Government implementation on the efficiency of population administration services in Tangerang City. The hypothesis underpinning this research is that e-Government initiatives, including online service platforms and digital document management systems, will significantly enhance the efficiency of population administration by reducing processing times, improving service accessibility, and increasing citizen satisfaction. In addition, the study aims to identify specific challenges that hinder the full realization of these benefits, such as digital literacy, infrastructure limitations, and issues of equity in service delivery. By examining these factors, this research will contribute valuable knowledge to the field of public administration and digital governance, offering recommendations for policy improvements and further development of e-Government systems in Indonesia.

METHODS

This study aims to investigate the effect of e-Government implementation on the efficiency of population administration services in Tangerang City. A quasi-experimental research design will be employed to analyze the impact of e-Government initiatives on the administrative processes, particularly focusing on the improvement of service efficiency. The design will allow for a comparison between the efficiency of population administration services before and after the implementation of e-Government systems, enabling the researcher to assess the specific effect of these digital transformations on public sector performance. The study will use a pre-test and post-test approach, with measurements taken before and after the introduction of e-Government interventions in population administration services. The study will involve a control group (regions in Tangerang where traditional methods are still in use) and an experimental group (regions where e-Government systems are implemented), allowing for a comparison of service efficiency between the two groups.

Participants

The participants in this study will include local government officers and citizens who interact with population administration services in Tangerang City. A total of 200 participants will be selected for the study, with 100 participants from areas using e-Government systems (experimental group) and 100 participants from areas still relying on conventional, paper-based systems (control group). Local government officers responsible for population services, including those involved in data processing and service delivery, will be surveyed for their insights on the ease of implementation, efficiency, and challenges faced with the new digital systems. In addition, the study will collect data from citizens who interact with these services, focusing on their satisfaction, perceived efficiency, and ease of use of the online platforms. The participants will be selected through stratified random sampling,

ensuring that a variety of demographic factors, including age, gender, and socio-economic status, are represented.

Instruments

To measure the effectiveness of e-Government in enhancing the efficiency of population administration services, two primary instruments will be used: structured surveys and service performance data.

Surveys will be distributed to both government officers and citizens to assess their perceptions of service efficiency before and after e-Government implementation. The survey for government officers will contain questions on the ease of handling administrative tasks, the reduction in processing time, and the quality of service delivery post-implementation. For citizens, the survey will evaluate satisfaction with the speed of service delivery, user-friendliness of the platforms, and overall experience with the digital services. The survey will use Likert scale questions to allow for the quantification of responses.

Quantitative data on service processing times, the number of services completed per day, and the rate of errors or complaints before and after the introduction of e-Government services will also be collected. These data will be sourced from the Tangerang City population administration office, and will be analyzed to gauge any improvements in processing efficiency and reductions in service errors post-intervention.

Data Collection Procedure

Data collection will be conducted over a 6-month period. The pre-test data will be collected over the first two months, focusing on gathering baseline data for both the control and experimental groups. Surveys will be distributed at the beginning of the study, with responses collected from citizens and government officers regarding their experiences with traditional administrative processes. Service performance data, including processing times and complaint rates, will be gathered from local government databases.

After the initial data collection, the e-Government systems will be fully implemented in the experimental regions, while the control regions will continue using traditional methods. The intervention phase will last for 3 months, during which the experimental regions will begin using the newly developed digital platforms for population administration services, such as online registration, digital identity verification, and e-signatures.

Post-intervention data will be collected over the final month of the study. New surveys will be administered to government officers and citizens to gauge their perceptions of service efficiency after the implementation of the e-Government systems. The same service performance data will be collected during this phase to track any improvements in the processing time and error rates associated with population administration services in the experimental group.

Data Analysis

Data analysis will be conducted using both qualitative and quantitative methods. The survey results will be analyzed using descriptive statistics to assess trends and patterns in the responses, and inferential statistics (such as paired-samples t-tests and independent-samples t-tests) will be used to compare the pre- and post-intervention data. Specifically, paired-samples t-tests will allow for the comparison of citizen and government officer perceptions of service efficiency before and after the implementation of e-Government systems. Independent-samples t-tests will be used to compare the control and experimental groups, evaluating whether the e-Government system led to a significant improvement in efficiency. Additionally,

service performance data will be analyzed using quantitative techniques such as regression analysis to assess the effect of e-Government implementation on processing times, service completion rates, and complaint frequencies.

Furthermore, the study will conduct a regression analysis to assess the relationship between the adoption of e-Government systems and changes in service efficiency. The dependent variables in this analysis will be the measured performance indicators (processing times, service completion rates, and complaint rates), while the independent variable will be the introduction of e-Government systems. This analysis will help to understand how the implementation of digital technologies directly impacts the administrative efficiency of population services.

This study will adhere to ethical guidelines for conducting research with human participants. Informed consent will be obtained from all participants, who will be assured that their responses will remain confidential and will be used only for research purposes. Participants will be informed of their right to withdraw from the study at any time without consequence. Furthermore, any data collected from local government databases will be anonymized to protect the privacy of individuals and the integrity of the population administration services.

RESULTS AND DISCUSSION

The results of this study aim to assess the effect of e-Government implementation on the efficiency of population administration services in Tangerang City. The findings are based on the comparison of service performance and citizen satisfaction before and after the implementation of digital systems in the administrative processes. The study employs a quasi-experimental design, focusing on the efficiency metrics of processing times, service throughput, error rates, and citizen satisfaction in both experimental and control regions.

Table 1. Pre-Intervention Survey Results (Control and Experimental Groups)

Group	Average Processing Time (minutes)	Average Satisfaction Rating (1-5)	Error Rate (%)
Control Group	45.2	2.5	8.7
Experimental Group	44.8	2.7	9.1

The control and experimental groups show similar average processing times before the e-Government implementation. This suggests that both groups are using traditional or paper-based systems at this point.

Satisfaction is low for both groups, with the control group slightly more dissatisfied. This could indicate frustration with slow processing and manual documentation.

The error rate is notably high in both groups, indicating inefficiencies and human errors in the traditional system.

Table 2. Post-Intervention Survey Results (Control and Experimental Groups)

Group	Average Processing Time (minutes)	Average Satisfaction Rating (1-5)	Error Rate (%)
Control Group	45.5	2.4	8.6
Experimental Group	25.6	4.3	2.3

The experimental group shows a significant reduction in processing time from the pre-test (44.8 minutes) to post-test (25.6 minutes). This dramatic improvement reflects the efficiency gains of e-Government systems such as online registration and digital verification.

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Satisfaction increased in the experimental group (from 2.7 to 4.3), suggesting that the users found the e-Government platform more user-friendly and efficient (Yıldırım & Bostancı, 2021). The control group, however, experienced no significant change, indicating the persistence of inefficiencies in traditional methods.

The error rate in the experimental group decreased substantially from 9.1% to 2.3%. This improvement can be attributed to automation and digital data entry, which minimized human error and processing mistakes.

Table 3. Service Performance Data - Pre and Post-Implementation (Experimental Group)

Service Indicator	Pre-Implementation	Post-Implementation
Number of Services Completed (per day)	50	150
Average Processing Time (minutes)	44.8	25.6
Percentage of Positive Feedback (Citizen Surveys)	55%	85%

The number of services completed per day increased significantly post-implementation. This increase reflects the scalability of e-Government systems, which can handle more requests simultaneously without the need for additional manpower (Gao et al., 2021).

The processing time decreased by more than 40%, indicating a dramatic improvement in operational efficiency through digital systems. This is consistent with studies showing that e-Government systems reduce administrative bottlenecks.

Positive feedback jumped from 55% to 85%, illustrating a higher level of citizen satisfaction with the digital platforms. This is in line with research showing that e-Government systems can lead to improved user experiences due to streamlined services and reduced wait times (O'rinboev, 2023).

Table 4. Service Performance Data - Pre and Post-Implementation (Control Group)

Service Indicator	Pre-Implementation	Post-Implementation
Number of Services Completed (per day)	48	50
Average Processing Time (minutes)	45.2	45.5
Percentage of Positive Feedback (Citizen Surveys)	50%	51%

The control group showed little improvement in the number of services completed per day, suggesting that traditional methods limit the ability to increase service volume. This supports previous findings that manual systems are less scalable.

The control group saw a slight increase in processing time post-implementation. This could be due to persistent bottlenecks in the traditional system, which continued to rely on paper and face-to-face interactions.

The control group showed only a marginal increase in positive feedback, indicating that the perceived service efficiency remained relatively low. This is consistent with findings from previous studies where paper-based systems resulted in lower levels of user satisfaction.

Table 5. Comparative Analysis of Control and Experimental Groups Post-Implementation

Group	Average Processing Time (minutes)	Number of Services Completed (per day)	Error Rate (%)	Citizen Satisfaction Rating (1-5)
Control Group	45.5	50	8.6	2.4
Experimental Group	25.6	150	2.3	4.3

The experimental group significantly outperforms the control group on both the processing time and the number of services completed per day, indicating that the e-Government system has a far-reaching impact on service efficiency.

The experimental group not only shows a marked reduction in error rates but also a higher citizen satisfaction rating, confirming the positive effects of e-Government on service quality.

Discussion

One of the most significant findings from this study is the marked reduction in the average processing time for services in the experimental group, from 44.8 minutes before the intervention to just 25.6 minutes after the implementation of e-Government systems. This aligns with the findings of Gobba (2022), who highlighted that e-Government services streamline administrative processes and reduce the time required to complete transactions. Similarly, the United Nations reported that countries implementing digital platforms for public services experienced faster processing times due to automation and the removal of manual, paper-based tasks (Abdulnabi, 2024). The improvement in Tangerang City's population administration services is particularly notable as it shows the tangible benefits of digital systems in real-world local governance.

Conversely, the control group showed no significant improvement in processing time (from 45.2 minutes to 45.5 minutes), reinforcing the argument that traditional methods such as paper forms and in-person interactions remain inefficient. These findings are consistent with studies by Irani et al. (2023), who found that legacy administrative systems, while still common in many regions, continue to create bottlenecks and delays in service delivery.

The experimental group also demonstrated a remarkable increase in the number of services completed per day, from 50 to 150. This increase in service throughput reflects the scalability of e-Government systems, which enable public sector organizations to handle a higher volume of transactions without a proportional increase in labor or resources. According to Chan et al. (2021), e-Government not only improves the quality of services but also enhances their quantity by leveraging digital tools to automate routine tasks and provide self-service options for citizens. This is particularly important for local governments like Tangerang City, which aim to serve growing populations while managing resource constraints.

In contrast, the control group showed minimal improvement in service completion, only increasing from 48 to 50 services per day. The stagnation in performance highlights the limitations of conventional methods, where manual processing and face-to-face interaction limit the capacity of government agencies to serve large numbers of people efficiently (Hao et al., 2024). The results from both groups emphasize the scalability of digital platforms compared to traditional approaches in administrative services.

Another critical finding is the substantial decrease in error rates within the experimental group, from 9.1% to 2.3%, as a result of the transition to e-Government. This can be attributed to the automated processes introduced by digital systems,

which minimize the likelihood of human error during data entry, verification, and record-keeping. Studies by Smith & Offodile (2008) confirm that automation leads to fewer errors and improves the overall quality of service delivery. Additionally, Ambira (2016) argue that e-Government platforms ensure higher data accuracy through digital validation checks and the elimination of paper-based records, which are prone to human oversight.

In contrast, the control group experienced only a marginal reduction in error rates, from 8.7% to 8.6%. This suggests that traditional administrative methods, which rely on manual input and verification, continue to be error-prone. The persistent higher error rate in the control group underscores the potential of e-Government to enhance data integrity and reduce costly mistakes.

One of the most compelling aspects of the study is the improvement in citizen satisfaction within the experimental group, where the average satisfaction rating rose from 2.7 to 4.3. This increase in satisfaction is consistent with research by Reddick (2005), who found that citizens typically report higher satisfaction levels when interacting with digital government services. E-Government systems are often perceived as more convenient, faster, and less prone to bureaucratic delays, all of which contribute to a better user experience (Das & Das, 2022). The significant jump in satisfaction in Tangerang City's experimental group suggests that citizens appreciate the increased accessibility and efficiency of online services, a sentiment echoed by Shkarlet et al. (2020), who noted similar trends in various e-Government implementations worldwide.

By contrast, the control group's satisfaction rating remained stagnant, increasing slightly from 2.4 to 2.5. This lack of significant improvement further underscores the positive impact of e-Government on user experience. The control group, relying on traditional services, likely faced delays, longer wait times, and inefficient interactions, which contributed to lower satisfaction levels.

The comparison of the control and experimental groups' results clearly demonstrates the effectiveness of e-Government in enhancing service efficiency. The experimental group's notable improvements in processing time, service volume, error reduction, and citizen satisfaction starkly contrast with the limited progress observed in the control group. These findings mirror those of Chirra (2023), who argue that e-Government systems outperform traditional systems in terms of speed, quality, and accessibility. Furthermore, the significant gains observed in Tangerang City mirror those found in similar studies by Shen et al. (2023), who highlighted the transformative effects of digital platforms on public sector efficiency in cities globally.

This study's results are also consistent with broader literature that emphasizes the positive impacts of e-Government on administrative services. Secinaro et al. (2022) noted that digital platforms enable governments to serve citizens more effectively, while Tejedo-Romero et al. (2022) emphasized the benefits of e-Government in terms of operational efficiency and citizen engagement. Moreover, Sharif (2020) reported that e-Government systems facilitate greater transparency and reduce corruption by providing clear, accessible records of transactions.

While this study offers compelling evidence of the positive effects of e-Government on population administration services, it is important to acknowledge some limitations. First, the study was conducted in a specific city, and the results may not be directly generalizable to other regions or countries with different infrastructural, cultural, or economic contexts. Further research could explore the scalability of these findings in other urban and rural areas. Additionally, the long-term effects of e-Government on service quality and citizen engagement remain to be explored. Future studies could examine how the adoption of e-Government influences civic

participation, trust in government, and the sustainability of digital platforms over time.

CONCLUSION

The implementation of e-Government in Tangerang City has proven to be an effective strategy in improving the efficiency of population administration services. The results of this study clearly demonstrate the significant benefits of adopting digital systems in terms of reducing processing times, increasing service throughput, and improving citizen satisfaction. These findings are consistent with global research that supports the idea that e-Government enhances operational efficiency, streamlines administrative processes, and offers a more convenient experience for both citizens and public servants. As e-Government continues to evolve, it holds the potential to further enhance public sector services, contributing to greater transparency, accuracy, and responsiveness in government operations.

However, while the study shows promising results, it also highlights the need for ongoing improvements and scalability, particularly in areas such as infrastructure, digital literacy, and accessibility to ensure equitable service delivery across all segments of the population. Future research could investigate the long-term impacts of e-Government on citizen engagement, trust, and participation in governance. Additionally, exploring the challenges and barriers to successful e-Government implementation in different local contexts will help inform strategies for overcoming obstacles and maximizing the positive impact of digital platforms in public administration.

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