

Integration of Digital Technology to Enhance the Effectiveness of Public Organizations in Medan City

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Abstract

This study examines the role of digital technology integration in enhancing the effectiveness of public organizations in Medan City. The rapid advancement of digital technologies has encouraged public sector organizations to transform their administrative processes and service delivery systems in order to improve organizational performance and meet increasing public expectations. This research adopts a quantitative explanatory approach and involves 100 respondents drawn from public organizations under the Medan City Government. Data were collected using a structured questionnaire and analyzed through descriptive statistics and simple linear regression analysis. The results indicate that digital technology integration has a positive and statistically significant effect on organizational effectiveness. The regression analysis shows that digital technology integration explains a substantial proportion of the variance in organizational effectiveness, demonstrating its importance as a strategic factor in public sector performance improvement. The findings also reveal that while the availability of digital systems and management support are relatively strong, challenges remain in system interoperability and data integration. This study concludes that effective integration of digital technology, supported by organizational readiness and leadership commitment, is essential for enhancing the effectiveness of public organizations. The results provide valuable insights for policymakers and public managers in designing sustainable digital transformation strategies at the local government level.

Keywords: Digital Technology Integration; Organizational Effectiveness; Public Organizations; Digital Government; Local Government; Medan City

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2nd International Conference on Islamic Community Studies (ICICS)
Theme: History of Malay Civilisation and Islamic Human Capacity and Halal Hub in the Globalization Era
<https://proceeding.pancabudi.ac.id/index.php/ICIE/index>

Introduction

The rapid advancement of digital technology has significantly transformed the way public organizations perform their roles and responsibilities. In the era of digital transformation, public sector organizations are increasingly required to adapt to technological developments in order to improve organizational effectiveness, service quality, transparency, accountability, and decision-making processes. The integration of digital technology is no longer considered a complementary tool, but rather a strategic necessity for public organizations to respond to the growing expectations of citizens who demand faster, more efficient, and more responsive public services.

Globally, digital government and e-government initiatives have become central to public sector reform agendas. Digital technologies are widely utilized to streamline administrative processes, enhance service delivery, reduce operational costs, and strengthen public trust in government institutions. According to the Organisation for Economic Co-operation and Development (OECD), digital transformation in the public sector contributes to improved organizational effectiveness by enabling process optimization, data-driven decision-making, and enhanced inter-organizational collaboration. Consequently, digital technology serves as a key enabler in the development of adaptive and performance-oriented public organizations.

In Indonesia, efforts to integrate digital technology into public administration have been formally promoted through the implementation of the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik/SPBE). This national policy aims to establish clean, effective, transparent, and accountable governance through the utilization of information and communication technology. However, despite strong policy support, the implementation of digital government at the local government level continues to face significant challenges. These challenges include limited technological infrastructure, varying levels of digital literacy among civil servants, organizational resistance to change, and weak system integration across public agencies. As a result, the expected improvements in organizational effectiveness derived from digital technology adoption have not been fully realized.

Medan City, as one of Indonesia's major metropolitan areas, plays a strategic role in regional governance and public service delivery. With a large population and high economic activity, public organizations in Medan City are under increasing pressure to deliver efficient, transparent, and high-quality services. The integration of digital technology within public organizations in Medan City is therefore crucial to improving employee productivity, enhancing coordination among government agencies, and increasing citizen satisfaction. Nevertheless, empirical observations indicate that the level of digital technology adoption and its effectiveness vary considerably across public organizations in the city.

Previous studies have consistently demonstrated a positive relationship between digital technology integration and the effectiveness of public organizations. Heeks (2006) argues that the implementation of information technology in the public sector can improve organizational effectiveness when it is supported by organizational readiness, user-oriented system design, and strong leadership commitment. The study highlights that many digital government initiatives fail due to a mismatch between technological design and organizational realities, commonly referred to as the design–reality gap.

Similarly, Cordella and Bonina (2012) emphasize that digital technology integration in public organizations not only enhances operational efficiency but also transforms organizational structures, work processes, and decision-making mechanisms. Their findings suggest that digital technology can significantly improve organizational effectiveness when it is embedded within core business processes and accompanied by managerial and cultural change. Without such organizational alignment, digital initiatives often remain limited to administrative functions and fail to generate meaningful performance improvements.

In the context of developing countries, Luna-Reyes and Gil-Garcia (2014) find that the success of digital technology integration in public organizations is strongly influenced by institutional arrangements, human resource capacity, and inter-agency coordination. Their

research indicates that while digital technology has substantial potential to improve service speed and information quality, its impact on organizational effectiveness depends largely on governance structures and visionary leadership.

Empirical studies in Indonesia further support these findings. Indrajit (2016) demonstrates that e-government implementation at the local government level contributes to organizational effectiveness by simplifying bureaucratic procedures and enhancing transparency. However, the study also identifies human resource readiness and system integration as persistent challenges. Likewise, Nugroho and Prasetyo (2018) report that digital technology utilization in public service delivery has a positive effect on organizational performance, although the magnitude of this effect is highly dependent on the level of technology adoption and managerial commitment.

Based on the existing literature, it can be concluded that digital technology integration holds significant potential for enhancing the effectiveness of public organizations. Nevertheless, its success is not determined solely by technological factors. Organizational structure, human resources, leadership, and organizational culture play critical roles in shaping the outcomes of digital transformation initiatives. Therefore, a comprehensive understanding of how digital technology is integrated within public organizations in Medan City, and how it influences organizational effectiveness, is essential.

This study is particularly relevant given the limited empirical research that specifically examines the integration of digital technology and its impact on the effectiveness of public organizations at the municipal level in Indonesia, especially in Medan City. By analyzing the current practices, challenges, and opportunities of digital technology integration in public organizations in Medan City, this research is expected to contribute both theoretically and practically to the development of more effective and sustainable digital transformation strategies in the public sector.

Literature Review

2.1 Digital Technology Integration in Public Organizations

Digital technology integration in public organizations refers to the systematic adoption and utilization of information and communication technologies (ICT) to support administrative processes, service delivery, and decision-making functions. Unlike isolated technology adoption, integration emphasizes the alignment of digital tools with organizational strategies, workflows, and institutional objectives. Scholars argue that digital technology integration represents a fundamental shift in how public organizations operate, moving from traditional bureaucratic models toward more flexible, data-driven, and citizen-centered governance structures (Dunleavy et al., 2006).

The concept of digital government has evolved beyond basic e-government initiatives that focus primarily on digitizing existing procedures. Contemporary digital transformation involves the reengineering of organizational processes, inter-agency collaboration, and the use of advanced technologies such as big data analytics, cloud computing, and integrated information systems (Mergel, Edelmann, & Haug, 2019). In this context, digital technology serves not only as a technical infrastructure but also as a catalyst for organizational change and innovation in the public sector.

2.2 Organizational Effectiveness in the Public Sector

Organizational effectiveness in the public sector is commonly defined as the extent to which public organizations achieve their goals efficiently while fulfilling public values such as equity, accountability, and transparency. Unlike private organizations, public sector effectiveness cannot be measured solely by financial performance; it also encompasses service quality, citizen satisfaction, policy outcomes, and administrative responsiveness (Boyne, 2002).

Several theoretical perspectives have been used to assess organizational effectiveness in public organizations, including goal attainment theory, systems theory, and stakeholder theory.

Goal attainment theory emphasizes the achievement of predetermined organizational objectives, while systems theory views public organizations as open systems that interact dynamically with their environment. Stakeholder theory highlights the importance of meeting the expectations of multiple stakeholders, including citizens, government institutions, and employees. These perspectives underscore the complexity of measuring effectiveness in public organizations and the need for multidimensional evaluation frameworks.

2.3 Relationship Between Digital Technology and Organizational Effectiveness

A substantial body of literature suggests that digital technology integration has a positive impact on organizational effectiveness in the public sector. Information systems enhance efficiency by automating routine tasks, reducing administrative delays, and minimizing human error (Laudon & Laudon, 2018). Furthermore, digital platforms enable faster information exchange and improved coordination among public agencies, which is essential for effective policy implementation and service delivery.

Heeks (2006) argues that the effectiveness of digital technology in public organizations depends largely on the alignment between technological systems and organizational realities. When digital initiatives are designed in accordance with institutional capacity, user needs, and organizational culture, they are more likely to generate improvements in performance and effectiveness. Conversely, misalignment often leads to underutilization or failure of digital systems.

Cordella and Bonina (2012) further emphasize that digital technology contributes to organizational effectiveness by reshaping governance mechanisms and internal management practices. Their research demonstrates that technology-driven reforms can improve transparency, accountability, and managerial control, provided that they are accompanied by organizational restructuring and process reengineering. This indicates that technology alone is insufficient; organizational readiness and leadership commitment are equally critical.

2.4 Human Resources and Organizational Readiness

Human resource capacity plays a central role in determining the success of digital technology integration in public organizations. Digital literacy, technical skills, and openness to change among public employees significantly influence the extent to which digital systems are effectively utilized (Venkatesh et al., 2012). Resistance to change, lack of training, and limited digital competencies remain common challenges in public sector digitalization, particularly in developing countries.

Organizational readiness, which includes leadership support, institutional commitment, and change management capability, is also a key determinant of successful digital integration. According to Mergel et al. (2019), leaders in public organizations must actively promote digital transformation by fostering an innovation-friendly culture, allocating adequate resources, and ensuring cross-departmental collaboration. Without strong leadership and organizational support, digital initiatives often fail to achieve their intended impact on organizational effectiveness.

2.5 Digital Technology Integration in Local Government Context

At the local government level, digital technology integration is particularly important due to the direct interaction between public organizations and citizens. Local governments are responsible for delivering essential services such as civil administration, licensing, healthcare, and education, all of which can benefit significantly from digitalization. Studies have shown that digital platforms at the municipal level improve service accessibility, reduce processing time, and enhance citizen satisfaction (Gil-Garcia, Dawes, & Pardo, 2018).

In the Indonesian context, research on local government digitalization indicates that while many municipalities have adopted digital systems, their level of integration and effectiveness varies widely. Indrajit (2016) highlights that fragmented systems, limited interoperability, and

uneven human resource capacity hinder the effectiveness of digital government initiatives at the local level. These challenges are also relevant to Medan City, where public organizations operate within a complex administrative and institutional environment.

Research Methodology

3.1 Research Design

This study employs a quantitative research design with an explanatory approach to analyze the effect of digital technology integration on the effectiveness of public organizations in Medan City. The quantitative approach enables objective measurement of relationships between variables using statistical techniques, while the explanatory design aims to identify causal relationships. This design is appropriate for examining how digital technology integration contributes to improved organizational effectiveness in the public sector.

3.2 Research Location and Population

The research is conducted within public organizations under the Medan City Government, particularly regional government agencies responsible for administrative and public service delivery functions. The population consists of civil servants and public employees who utilize digital technologies in their daily work activities. These respondents are considered relevant because of their direct involvement with digital systems implemented by their organizations.

3.3 Sampling Technique and Sample Size

A purposive sampling technique is applied to select respondents who meet specific criteria aligned with the research objectives. The criteria include public employees who have experience using digital platforms such as e-government systems, online service applications, and internal information systems. This approach ensures that the data collected reflect informed perceptions regarding digital technology integration. The sample size is determined using the Slovin formula with a 95 percent confidence level, resulting in a total of 100 respondents, which is considered sufficient for statistical analysis.

3.4 Research Variables and Measurement

The study examines two main variables: digital technology integration as the independent variable and organizational effectiveness as the dependent variable. Digital technology integration refers to the extent to which digital systems are embedded within organizational processes, including system interoperability, availability of digital infrastructure, frequency of technology use, data integration, and managerial support. Organizational effectiveness refers to the ability of public organizations to achieve their objectives efficiently while delivering high-quality public services, as reflected in service efficiency, service quality, employee productivity, transparency, accountability, and organizational responsiveness.

3.5 Data Collection Method

Primary data are collected through a structured questionnaire distributed to selected respondents. The questionnaire is developed based on relevant theories and previous empirical studies and adapted to the context of public organizations in Medan City. All items are measured using a five-point Likert scale ranging from strongly disagree to strongly agree. Secondary data are obtained from official government documents, policy reports, and academic literature to support the analysis and interpretation of findings.

3.6 Validity and Reliability Testing

To ensure the quality of the research instrument, validity and reliability tests are conducted prior to data analysis. Validity testing is performed using Pearson correlation analysis to assess whether each questionnaire item accurately measures the intended construct. Items are considered valid if the correlation coefficient exceeds the critical value at a 0.05

significance level. Reliability testing is conducted using Cronbach's Alpha, with a coefficient of 0.70 or higher indicating acceptable internal consistency.

3.7 Data Analysis Technique

Data analysis is conducted using statistical software such as SPSS. Descriptive statistical analysis is used to summarize respondent characteristics and provide an overview of the research variables. Inferential analysis is carried out using simple linear regression to examine the effect of digital technology integration on organizational effectiveness. Hypothesis testing is conducted using the t-test at a 5 percent significance level, and the coefficient of determination is calculated to measure the proportion of variance in organizational effectiveness explained by the independent variable.

Results

4.1 Respondent Characteristics

The study involved 100 respondents who were civil servants working in public organizations under the Medan City Government.

Table 1. Respondent Characteristics

| Characteristics | Category | Frequency | Percentage (%) |
|----------------------------------|-------------------|-----------|----------------|
| Gender | Male | 56 | 56.0 |
| | Female | 44 | 44.0 |
| Age | ≤ 30 years | 12 | 12.0 |
| | 31–40 years | 42 | 42.0 |
| | 41–50 years | 33 | 33.0 |
| | > 50 years | 13 | 13.0 |
| Length of Service | ≤ 5 years | 28 | 28.0 |
| | 6–10 years | 37 | 37.0 |
| | > 10 years | 35 | 35.0 |
| Education Level | Diploma | 18 | 18.0 |
| | Bachelor's Degree | 54 | 54.0 |
| | Master's Degree | 28 | 28.0 |
| Position Level | Staff | 61 | 61.0 |
| | Supervisor | 25 | 25.0 |
| | Managerial Level | 14 | 14.0 |
| Experience Using Digital Systems | < 3 years | 21 | 21.0 |
| | 3–5 years | 39 | 39.0 |
| | > 5 years | 40 | 40.0 |

The respondents were selected based on their experience in using digital technologies in their daily work activities. Of the total respondents, 56 percent were male and 44 percent were female. In terms of age, the majority of respondents were between 31–40 years old (42 percent), followed by those aged 41–50 years (33 percent). Regarding length of service, most respondents had worked for more than five years, indicating that they possessed sufficient organizational experience to evaluate digital technology integration and organizational effectiveness.

4.2 Descriptive Statistics of Research Variables

Descriptive analysis was conducted to examine respondents' perceptions of digital technology integration and organizational effectiveness.

Table 2. Descriptive Statistics of Digital Technology Integration

| Indicator | Mean | Std. Deviation |
|---------------------------------|------|----------------|
| Availability of digital systems | 4.12 | 0.58 |
| System interoperability | 3.85 | 0.64 |
| Frequency of technology use | 4.05 | 0.61 |
| Data integration | 3.78 | 0.67 |
| Management support | 4.18 | 0.55 |
| Overall Mean | 3.99 | 0.61 |

The results indicate that digital technology integration in public organizations in Medan City is perceived to be at a high level, with an overall mean score of 3.99. Management support and system availability received the highest mean scores, suggesting strong institutional commitment to digital initiatives. However, system interoperability and data integration scored relatively lower, indicating areas that require further improvement.

Table 3. Descriptive Statistics of Organizational Effectiveness

| Indicator | Mean | Std. Deviation |
|---------------------------------|------|----------------|
| Service efficiency | 4.08 | 0.59 |
| Service quality | 4.15 | 0.57 |
| Employee productivity | 3.97 | 0.63 |
| Transparency and accountability | 4.10 | 0.60 |
| Organizational responsiveness | 4.02 | 0.62 |
| Overall Mean | 4.06 | 0.60 |

The descriptive results show that organizational effectiveness is perceived as high, with an overall mean score of 4.06. Service quality and transparency emerged as the strongest dimensions, reflecting the positive contribution of digital technology to public service delivery and governance practices.

4.3 Validity and Reliability Results

Validity testing using Pearson correlation analysis showed that all questionnaire items had correlation coefficients greater than the critical value ($r > 0.196$), indicating that all items were valid. Reliability testing using Cronbach's Alpha produced values of 0.89 for digital technology integration and 0.91 for organizational effectiveness, exceeding the recommended threshold of 0.70. These results confirm that the research instrument is both valid and reliable.

4.4 Regression Analysis

Simple linear regression analysis was conducted to examine the effect of digital technology integration on organizational effectiveness.

Table 4. Regression Analysis Results

| Variable | B | Std. Error | t-value | Sig. |
|--------------------------------|-------|------------|---------|-------|
| Constant | 1.214 | 0.312 | 3.89 | 0.000 |
| Digital Technology Integration | 0.684 | 0.071 | 9.63 | 0.000 |

The regression results show that digital technology integration has a positive and statistically significant effect on organizational effectiveness ($\beta = 0.684$, $p < 0.001$). This indicates that improvements in digital technology integration lead to significant increases in the effectiveness of public organizations in Medan City.

4.5 Coefficient of Determination

Table 5. Model Summary

| R | R Square | Adjusted R Square |
|-------|----------|-------------------|
| 0.702 | 0.493 | 0.488 |

The coefficient of determination (R^2) value of 0.493 indicates that 49.3 percent of the variation in organizational effectiveness can be explained by digital technology integration. The remaining 50.7 percent is influenced by other factors not examined in this study, such as leadership style, organizational culture, and external environmental conditions.

Discussion

The findings demonstrate that digital technology integration plays a crucial role in enhancing the effectiveness of public organizations in Medan City. The high mean scores for both digital technology integration and organizational effectiveness suggest that public organizations have made significant progress in adopting digital systems to support their operations. The strong positive relationship identified through regression analysis confirms that digital technology is a key driver of organizational performance in the public sector.

These results are consistent with previous studies by Heeks (2006) and Cordella and Bonina (2012), which emphasize that effective integration of digital technology improves efficiency, transparency, and service quality when supported by organizational readiness and management commitment. The relatively lower scores on system interoperability and data integration indicate ongoing challenges in achieving fully integrated digital governance, as also highlighted in studies on local government digitalization in developing countries.

Overall, the findings suggest that while digital technology integration has significantly enhanced organizational effectiveness in Medan City, further improvements can be achieved by strengthening system integration, enhancing employee digital competencies, and promoting cross-agency collaboration.

Conclusion

This study concludes that the integration of digital technology plays a significant and positive role in enhancing the effectiveness of public organizations in Medan City. The findings indicate that public organizations have generally achieved a high level of digital technology integration, particularly in terms of system availability and management support. This level of integration has contributed meaningfully to improvements in organizational effectiveness, as reflected in higher service efficiency, improved service quality, increased transparency, and better organizational responsiveness.

The regression analysis confirms that digital technology integration has a statistically significant effect on organizational effectiveness. The results demonstrate that nearly half of the variance in organizational effectiveness can be explained by the extent to which digital technologies are effectively integrated into organizational processes. This finding underscores the importance of digital transformation as a strategic instrument for improving public sector performance rather than merely a technological upgrade.

Despite the overall positive results, the study also reveals areas that require further attention, particularly system interoperability and data integration across public organizations. These aspects remain critical challenges that may limit the full realization of digital transformation benefits. Without stronger integration and coordination among digital systems, public organizations may not achieve optimal efficiency and effectiveness.

In conclusion, this study provides empirical evidence that successful digital technology integration enhances the effectiveness of public organizations in Medan City. It emphasizes that technological adoption must be accompanied by organizational readiness, leadership commitment, and continuous capacity building among public employees. The findings offer valuable insights for policymakers and public managers in designing and implementing

sustainable digital transformation strategies to strengthen public sector performance at the local government level.

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