

Digital Ethics and Green Computing for Sustainable Digital Bureaucratic Transformation: Evidence from the West Sulawesi Provincial Plantation Office

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Abstract. Digital transformation has become an essential component of public sector reform aimed at improving administrative efficiency, transparency, accountability, and service quality. However, sustainable digital transformation requires not only technological innovation but also the integration of ethical governance and environmentally responsible information technology practices. This study aims to examine the role of digital ethics and green computing in supporting digital bureaucratic transformation at the West Sulawesi Provincial Plantation Office. The study employed a descriptive qualitative case study approach supported by questionnaire data collected from 60 civil servants using purposive sampling, complemented by documentary analysis of relevant government regulations and institutional documents. The data were analyzed using the interactive qualitative analysis model consisting of data condensation, data display, and conclusion drawing. The findings indicate that digital ethics strengthens transparency, accountability, information security, and responsible technology utilization, thereby enhancing organizational trust and supporting effective digital governance. Furthermore, green computing contributes to bureaucratic efficiency through paperless administration, digital document management, efficient utilization of information technology resources, and environmentally sustainable administrative practices. The integration of digital ethics and green computing was found to reinforce digital bureaucratic transformation by improving organizational effectiveness, administrative responsiveness, and public service quality. These findings suggest that sustainable digital government depends not only on technological capability but also on the institutional integration of ethical governance and environmentally responsible digital practices. The study provides practical recommendations for local governments to strengthen digital governance policies, improve employees' digital competencies, and expand sustainable technology initiatives in support of modern public administration.

Keywords: Digital Ethics, Green Computing, Digital Bureaucratic Transformation, Digital Government, Public Administration.

1. Introduction

The rapid advancement of information and communication technology (ICT) has fundamentally transformed public administration systems across the world, shifting government institutions from conventional bureaucratic models toward digital governance. Digital transformation is no longer viewed merely as the adoption of information technology but rather as a comprehensive institutional reform that reshapes organizational structures, administrative processes, decision-making mechanisms, and public service delivery. Governments increasingly rely on digital platforms to improve administrative efficiency, policy coordination, transparency, and citizen participation while responding to growing public expectations for accessible and responsive services. Recent studies emphasize that digital transformation has become one of the primary strategies for strengthening governance capacity and improving public value creation in the public sector [1], [2], [3]. Consequently, digital bureaucracy has emerged as an essential component of modern governance aimed at creating more adaptive, accountable, and citizen-oriented public institutions.

In Indonesia, digital transformation has become an integral part of bureaucratic reform through the implementation of the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik/SPBE). SPBE represents the government's strategic framework for integrating information technology into governance processes, public administration, and public service delivery. The implementation of SPBE is expected to improve interoperability among government agencies, increase organizational efficiency, strengthen transparency, and enhance the quality of public services. Several studies indicate that the successful implementation of SPBE contributes significantly to bureaucratic modernization, institutional innovation, and digital public service performance. Nevertheless, the implementation of digital government across Indonesian local governments remains uneven because differences in institutional readiness, technological infrastructure, human resource capability, and organizational commitment continue to influence digital transformation outcomes [4], [5], [6]. These conditions indicate that digital transformation requires not only technological investment but also organizational and managerial adaptation.

The urgency of strengthening digital bureaucracy is becoming increasingly important as public demand for efficient, transparent, and integrated public services continues to rise. Traditional administrative systems characterized by fragmented procedures, excessive paperwork, and manual data processing are no longer capable of meeting contemporary governance challenges. Digital technologies enable governments to automate administrative activities, improve inter-agency coordination, facilitate evidence-based policymaking, and provide real-time public services. [7] argue that digital technologies fundamentally reshape bureaucratic work by integrating digital platforms, electronic data management, and collaborative governance mechanisms. Similarly, [8] emphasize that successful digital government depends on organizational transformation rather than merely technological deployment. Therefore, local government institutions are required to continuously strengthen their digital capabilities to achieve effective and sustainable public administration.

One regional institution facing these transformation challenges is the West Sulawesi Provincial Plantation Office. As a government agency responsible for plantation development, agricultural extension, licensing administration, production monitoring, and public information services, this institution requires an integrated digital governance system to support effective decision-making and service delivery. The implementation of digital bureaucracy within the plantation sector involves various administrative activities, including digital documentation, electronic correspondence, integrated plantation databases, online reporting systems, and digital communication with farmers and other stakeholders. However, successful digital transformation in public organizations depends not only on technological readiness but also on institutional governance, organizational culture, leadership commitment, and employee competence in utilizing digital technologies effectively [9], [10]. These conditions indicate that organizational transformation must be accompanied by broader governance reforms that ensure responsible and sustainable digital implementation.

One important aspect that increasingly determines the success of digital government is the application of digital ethics. As governments become increasingly dependent on digital technologies, ethical issues such as personal data protection, cybersecurity, transparency, accountability, algorithmic fairness, and responsible use of artificial intelligence have become central concerns in public administration. Digital ethics provides normative guidance for ensuring that technological innovation supports public interests while minimizing risks associated with information misuse, cyber threats, and privacy violations. Recent studies demonstrate that public trust in digital government is strongly influenced by governments' ability to implement ethical standards in managing digital information and delivering electronic services [11], [12]. Therefore, strengthening digital ethics has become an indispensable prerequisite for establishing trustworthy, accountable, and citizen-centered digital governance.

Besides ethical considerations, environmental sustainability has also become an increasingly important dimension of public sector digital transformation through the concept of green computing. Although digitalization reduces dependence on paper-based administration, it simultaneously increases electricity consumption, electronic waste generation, and demand for digital infrastructure. Green computing promotes environmentally responsible information technology management through energy-efficient computing, sustainable procurement of digital equipment, virtualization, responsible electronic waste management, and optimization of digital resources. Studies have shown that integrating green computing into public administration contributes to sustainable governance by reducing environmental impacts while improving operational efficiency [13], [14]. In government institutions, green computing practices include electronic document management, cloud-based administration, online meetings, digital archiving, and energy-efficient office technologies that support environmentally sustainable bureaucratic operations.

Although digital ethics and green computing have generally been discussed as separate concepts, recent literature suggests that both dimensions should be integrated within digital bureaucratic transformation because technological advancement without ethical governance and environmental responsibility may generate new

governance risks. Ethical digital governance ensures information integrity, public trust, and accountability, whereas green computing ensures that technological innovation remains environmentally sustainable. [15] argues that successful public sector digital transformation depends on balancing technological innovation with ethical governance and sustainability principles. However, previous studies have predominantly examined SPBE implementation, digital transformation, digital ethics, or green computing independently, while limited empirical research has explored how these three dimensions interact simultaneously within local government institutions, particularly in developing regions. This gap demonstrates the need for more comprehensive studies examining the integration of technological, ethical, and environmental perspectives in digital governance.

Based on these considerations, this study aims to analyze how digital ethics and green computing support bureaucratic transformation through the implementation of digital governance at the West Sulawesi Provincial Plantation Office. By examining the interaction between ethical digital practices, environmentally sustainable technology utilization, and bureaucratic modernization, this research is expected to contribute to the development of digital public administration literature while providing practical recommendations for local governments in strengthening SPBE implementation and realizing an effective, transparent, accountable, and environmentally sustainable bureaucracy.

1.1. Digital Bureaucratic Transformation

Digital bureaucratic transformation refers to the comprehensive process of restructuring public administration through the adoption and integration of digital technologies into government operations, decision-making, and public service delivery. Unlike simple technological adoption, digital transformation involves organizational, managerial, and institutional changes that reshape how governments create public value, coordinate administrative activities, and interact with citizens. [9] defines digital transformation as a process through which digital technologies fundamentally improve organizational capabilities, operational processes, and service innovation. Similarly, [10] argue that digital transformation in the public sector encompasses organizational redesign, digital leadership, process innovation, and institutional adaptation rather than merely implementing new information systems.

Within the public sector, digital bureaucratic transformation aims to increase administrative efficiency, transparency, accountability, interoperability, and citizen participation. Governments increasingly utilize electronic document management, integrated databases, cloud computing, digital licensing systems, artificial intelligence, and online public service platforms to improve governance performance. These technological innovations reduce bureaucratic complexity, accelerate decision-making, minimize administrative costs, and enhance service accessibility. According to [16], successful digital government requires not only advanced technological infrastructure but also institutional collaboration, regulatory alignment, and organizational readiness to support continuous innovation.

In Indonesia, digital bureaucratic transformation has become one of the primary objectives of bureaucratic reform through the implementation of the Electronic-Based Government System (SPBE). SPBE seeks to integrate digital technology into government administration to improve efficiency, service quality, and transparency while promoting data interoperability among government institutions. However, numerous studies reveal that the implementation of SPBE across local governments remains uneven due to disparities in digital infrastructure, organizational capacity, leadership commitment, and human resource competence [17], [18]. Consequently, the effectiveness of digital transformation depends not only on technological investment but also on institutional readiness and organizational change management.

Recent literature also emphasizes that digital bureaucratic transformation should be viewed as a multidimensional process involving technology, governance, organizational culture, human capital, and public trust. Organizations capable of integrating these dimensions are more likely to achieve sustainable digital government and improve public service performance. Therefore, digital transformation represents a strategic approach for modernizing bureaucracy while strengthening government responsiveness and institutional resilience in an increasingly digital society [19], [20].

1.2. Digital Ethics in Public Administration

The increasing dependence of governments on digital technologies has made digital ethics one of the fundamental pillars of contemporary public administration. Digital ethics refers to the principles, norms, and moral standards that regulate the responsible development, management, and utilization of digital technologies to protect public interests. In government institutions, digital ethics encompasses accountability, transparency, fairness, privacy protection, cybersecurity, responsible data governance, and ethical decision-making in digital environments. [21] emphasize that ethical digital governance should ensure that technological innovation supports human well-being while respecting fundamental rights and democratic values.

The expansion of digital government services has simultaneously increased the complexity of ethical challenges faced by public organizations. Government institutions now manage large volumes of sensitive citizen data, making issues such as personal data protection, cyberattacks, algorithmic bias, digital surveillance, and misuse of information increasingly important. [22] explain that public trust in digital government largely depends on governments' ability to maintain information integrity, protect confidential data, and implement transparent governance mechanisms. Without appropriate ethical standards, technological innovation may increase governance risks rather than improve public service quality.

Digital ethics also plays a strategic role in supporting organizational accountability during digital transformation. Ethical governance ensures that digital technologies are utilized to improve public value rather than merely increasing administrative efficiency. According to [23], effective digital leadership integrates ethical principles into organizational decision-making, promotes transparency, and encourages responsible digital innovation. This perspective indicates that ethical governance should become an integral component of bureaucratic modernization rather than a complementary administrative function.

Furthermore, the implementation of digital ethics requires institutional commitment through the development of comprehensive regulations, cybersecurity policies, employee digital literacy, ethical leadership, and continuous monitoring of digital governance practices. These elements collectively contribute to building sustainable public trust while ensuring that digital transformation remains aligned with democratic governance principles and public accountability.

1.3. Green Computing

Green computing refers to the environmentally sustainable design, implementation, utilization, and disposal of information technology resources while minimizing negative environmental impacts. The concept extends beyond energy efficiency by promoting sustainable procurement, responsible electronic waste management, virtualization, cloud computing optimization, and environmentally friendly digital infrastructure. [24] defines green computing as a holistic strategy for reducing energy consumption and environmental degradation throughout the lifecycle of information technology systems.

Although digital transformation reduces paper-based administration and improves operational efficiency, expanding digital infrastructure simultaneously increases electricity consumption, greenhouse gas emissions, and electronic waste generation. [25] estimate that information and communication technologies contribute an increasing proportion of global carbon emissions due to expanding digital infrastructure and data processing requirements. Consequently, governments are increasingly expected to integrate sustainability principles into digital transformation initiatives to ensure that technological advancement does not generate additional environmental burdens.

Within public administration, green computing supports sustainable governance by encouraging paperless administration, cloud-based document management, energy-efficient computing equipment, virtualization technologies, environmentally responsible procurement, and electronic waste recycling. These practices not only reduce environmental impacts but also improve organizational efficiency by lowering operational costs associated with paper consumption, physical document storage, electricity usage, and equipment maintenance. [26] argues that environmentally sustainable digital governance contributes directly to achieving broader public sector sustainability objectives through responsible resource utilization.

Recent studies also suggest that green computing has become an essential component of digital government because sustainable technology management enhances organizational resilience while supporting national environmental policies. Therefore, environmental sustainability should no longer be considered a separate organizational initiative but rather an integral dimension of digital bureaucratic transformation.

1.4. Relationship between Digital Ethics and Green Computing in Digital Bureaucratic Transformation

Digital ethics and green computing represent two complementary dimensions that strengthen the sustainability of digital bureaucratic transformation. While digital ethics focuses on ensuring responsible, transparent, and accountable use of digital technologies, green computing emphasizes minimizing environmental impacts arising from technological adoption. Together, these concepts create a governance model that balances technological innovation with social responsibility and environmental sustainability.

Recent public administration literature suggests that successful digital transformation cannot rely solely on technological capability because organizational legitimacy increasingly depends on ethical governance and sustainable resource management. Ethical digital governance strengthens public trust through secure data management, privacy protection, and accountable decision-making, whereas green computing improves organizational sustainability through efficient resource utilization and environmentally responsible digital

infrastructure [27], [28]. Consequently, integrating these two perspectives enables governments to achieve both administrative excellence and sustainable development objectives.

Furthermore, organizations implementing ethical digital governance are generally more capable of adopting environmentally sustainable technologies because both approaches emphasize long-term organizational responsibility, stakeholder orientation, and institutional accountability. [29] argues that sustainable digital government requires simultaneous attention to technological innovation, ethical governance, environmental stewardship, and organizational resilience. Therefore, digital ethics and green computing should not be treated as independent initiatives but rather as mutually reinforcing components of modern public administration.

Based on this theoretical perspective, digital bureaucratic transformation is expected to be strengthened through the implementation of digital ethics and green computing. Digital ethics ensures that technological innovation remains accountable and trustworthy, while green computing guarantees that digital transformation supports environmental sustainability. The integration of these concepts provides a comprehensive foundation for achieving efficient, transparent, responsible, and sustainable digital governance. Accordingly, the conceptual framework developed in this study proposes that digital ethics and green computing jointly contribute to strengthening digital bureaucratic transformation, as illustrated in Figure 1.

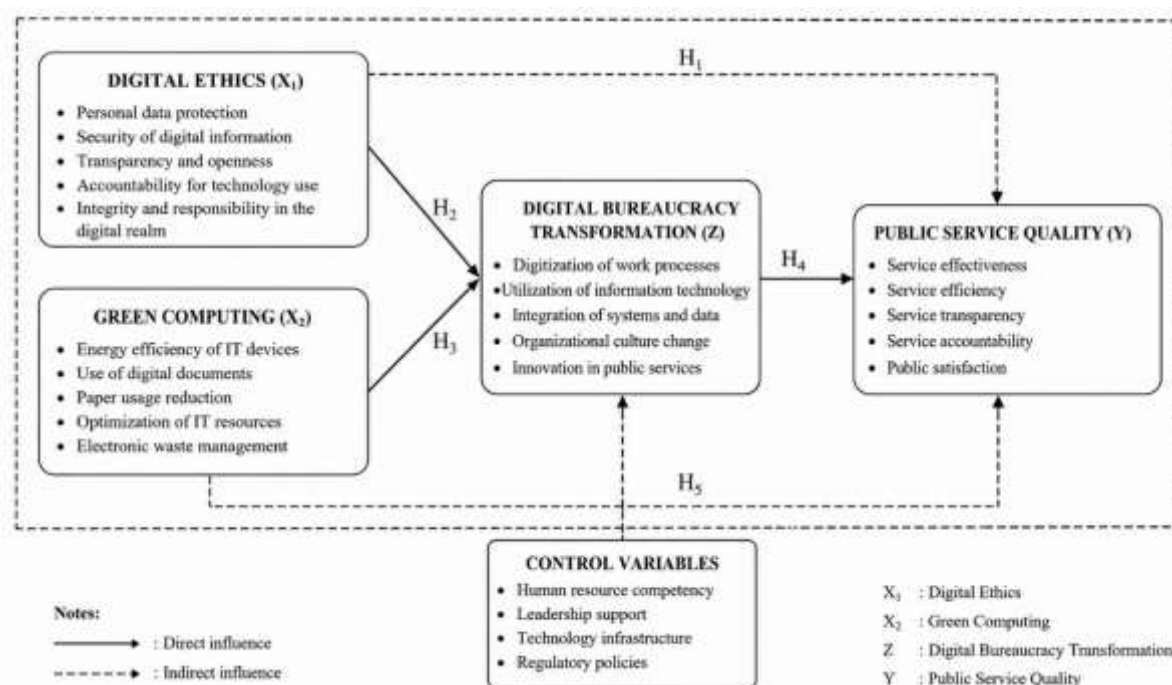


Figure 1. Conceptual Framework

2. Method

This study employed a descriptive qualitative approach with a case study design to examine how digital ethics and green computing support digital bureaucratic transformation within the West Sulawesi Provincial Plantation Office. A qualitative approach was selected because the study seeks to understand organizational practices, institutional processes, and employees' perceptions regarding the implementation of digital governance rather than to test causal relationships among variables. According to [30], qualitative research is appropriate for exploring complex social and organizational phenomena in their natural settings, allowing researchers to obtain an in-depth understanding of participants' experiences, institutional contexts, and administrative practices. This approach is particularly relevant because digital bureaucratic transformation represents a multidimensional process involving technological, organizational, ethical, and environmental dimensions that cannot be fully explained using quantitative measurements alone.

The research adopted a case study strategy because the West Sulawesi Provincial Plantation Office represents a public organization that has implemented various forms of digital administration in support of government services. A case study enables researchers to investigate contemporary organizational phenomena within their real-life context while considering institutional characteristics, governance practices, and

organizational dynamics [31]. Through this approach, the study focuses on understanding how digital ethics and environmentally sustainable technology practices contribute to bureaucratic transformation in local government administration.

Data were collected from both primary and secondary sources. Primary data were obtained through questionnaires distributed to civil servants working at the West Sulawesi Provincial Plantation Office. The questionnaire was designed to capture employees' perceptions regarding the implementation of digital ethics, environmentally friendly information technology practices, and the progress of digital bureaucratic transformation within the institution. Secondary data consisted of government regulations, organizational reports, official documents, previous research articles, books, and scientific publications discussing digital government, SPBE, digital ethics, green computing, and public administration. Combining multiple data sources enables data triangulation and enhances the credibility of qualitative findings [32].

The respondents consisted of 60 civil servants selected using purposive sampling. This sampling technique was chosen because only employees directly involved in digital administrative processes, electronic information systems, and public service delivery possessed sufficient knowledge and experience relevant to the research objectives. Purposive sampling is widely applied in qualitative studies to obtain information-rich participants capable of providing meaningful insights into the phenomenon under investigation [33].

The research instrument consisted of a structured questionnaire containing open-ended and closed-ended questions related to four analytical dimensions, namely digital ethics, green computing, digital bureaucratic transformation, and public service quality. The digital ethics dimension included indicators such as information transparency, data privacy, cybersecurity awareness, accountability, and responsible technology utilization. Green computing was examined through energy efficiency, paperless administration, optimization of digital resources, and electronic waste management. Digital bureaucratic transformation focused on digital service integration, administrative process improvement, organizational innovation, and digital work culture, while public service quality emphasized effectiveness, efficiency, accessibility, responsiveness, and service transparency. These dimensions were developed based on previous studies concerning digital government, sustainable public administration, and digital governance.

Data analysis was conducted using the interactive qualitative analysis model proposed by [34], consisting of three interconnected stages: data condensation, data display, and conclusion drawing and verification. During data condensation, questionnaire responses and documentary evidence were organized, coded, and categorized according to the research themes. The categorized findings were then presented through descriptive narratives supported by tables to facilitate interpretation. Finally, conclusions were drawn by identifying recurring patterns, relationships among the research themes, and their implications for digital bureaucratic transformation within the organization.

To ensure the trustworthiness of the research findings, several strategies were employed, including data triangulation, source triangulation, and continuous comparison between empirical findings and previous studies. Documentary evidence was compared with respondents' perceptions and relevant scientific literature to improve the credibility, consistency, and dependability of the analysis. This procedure strengthens the validity of the study by ensuring that the findings are supported by multiple sources of evidence rather than relying solely on a single data collection technique [35].

Overall, this methodological approach enables the study to provide a comprehensive understanding of how digital ethics and green computing contribute to digital bureaucratic transformation within the West Sulawesi Provincial Plantation Office. The integration of empirical evidence from organizational members and documentary analysis provides a richer perspective on the opportunities and challenges associated with implementing sustainable digital governance in local government institutions.

3. Result and Discussion

The findings indicate that the implementation of digital ethics and green computing has played an important role in supporting digital bureaucratic transformation at the West Sulawesi Provincial Plantation Office. Based on the analysis of questionnaire responses from 60 civil servants, supported by organizational documents and relevant policy regulations, the institution has gradually integrated digital technologies into administrative activities and public service delivery. Respondents generally perceived that the adoption of electronic administrative systems has simplified bureaucratic procedures, accelerated document processing, improved internal communication, and enhanced access to public information. These findings suggest that digital transformation has shifted organizational practices from conventional paper-based administration toward a more integrated digital governance model.

The implementation of digital bureaucratic transformation is reflected in several organizational practices, including electronic correspondence, digital archiving, online reporting systems, electronic document management, and the increasing utilization of digital communication platforms. Respondents reported that these technologies have reduced administrative delays and facilitated coordination among organizational units. Moreover, digital platforms have improved information accessibility for farmers and other stakeholders by enabling faster dissemination of plantation-related information and government programs. These findings demonstrate that digital technologies have contributed not only to operational efficiency but also to greater organizational responsiveness in public service delivery.

The study also found that digital ethics has become an increasingly important component of organizational governance during the digital transformation process. Most respondents acknowledged that the institution has strengthened data security practices, promoted transparency in digital administration, and increased awareness regarding the responsible use of information technology. Employees recognized the importance of protecting confidential information, maintaining data accuracy, and ensuring accountability when utilizing digital systems. Although several respondents indicated that cybersecurity awareness training could still be improved, the overall implementation of ethical digital governance was perceived positively. This finding indicates that organizational commitment to digital ethics contributes to strengthening public trust while minimizing risks associated with information misuse.

Green computing practices were also found to support organizational efficiency and environmental sustainability. Respondents reported that the transition toward paperless administration has substantially reduced paper consumption, printing activities, and physical document storage. The increased use of electronic documentation, cloud-based storage, and digital communication has improved administrative efficiency while simultaneously supporting environmentally responsible resource utilization. Furthermore, respondents recognized that adopting energy-efficient digital equipment and reducing unnecessary printing activities contribute to lowering operational costs and supporting sustainable government initiatives.

To provide an overview of respondents' perceptions, descriptive statistical analysis was conducted using the average score of each research dimension. The results indicate that all dimensions were perceived positively by employees, suggesting that digital ethics, green computing, digital bureaucratic transformation, and public service quality have been implemented at satisfactory levels within the organization.

Table 1. Descriptive Statistics of Research Dimensions

Research Dimension	Mean	Standard Deviation	Category
Digital Ethics	4.21	0.54	Good
Green Computing	4.10	0.61	Good
Digital Bureaucratic Transformation	4.18	0.57	Good
Public Service Quality	4.25	0.50	Very Good

Among the four dimensions, public service quality obtained the highest average score (4.25), indicating that respondents perceived noticeable improvements in service effectiveness, responsiveness, transparency, and accessibility following the implementation of digital administrative systems. Digital ethics also received a high evaluation (4.21), reflecting employees' positive perceptions regarding data protection, information transparency, and accountability in digital governance. Green computing recorded a slightly lower mean score (4.10), suggesting that although environmentally sustainable technology practices have been implemented, further improvements are still needed, particularly regarding energy-efficient technology utilization and electronic waste management. Overall, the descriptive findings indicate that the organization has successfully initiated a balanced approach to digital transformation by integrating technological innovation with ethical governance and environmental sustainability.

The qualitative interpretation of the findings further reveals a close relationship among the three research dimensions. Respondents consistently emphasized that digital technologies alone are insufficient to achieve successful bureaucratic transformation unless accompanied by ethical governance and environmentally sustainable technology management. Ethical digital practices improve organizational accountability and public confidence in government services, whereas green computing enhances operational efficiency while supporting sustainable resource management. Consequently, the integration of these two dimensions strengthens the implementation of digital bureaucratic transformation and contributes to improving public service quality.

Overall, the findings suggest that the digital transformation implemented by the West Sulawesi Provincial Plantation Office has progressed beyond simple technological adoption toward broader organizational modernization. Although several challenges remain, including strengthening digital competencies, improving cybersecurity awareness, and expanding environmentally sustainable technology practices, the institution has

demonstrated substantial progress in developing a modern bureaucracy characterized by efficiency, transparency, accountability, and sustainability. These findings provide empirical evidence that integrating digital ethics and green computing represents a strategic approach for strengthening digital governance within local government institutions.

The findings demonstrate that digital bureaucratic transformation within the West Sulawesi Provincial Plantation Office has progressed beyond the simple adoption of digital technologies toward broader organizational modernization. The transition from conventional administrative procedures to digital-based governance has improved the efficiency of internal administrative processes, accelerated information exchange, and enhanced public access to government services. These findings support the perspective of [9], who argues that digital transformation should be understood as an organizational transformation process rather than merely technological implementation. Likewise, [10] emphasize that successful digital government requires institutional adaptation, organizational learning, and process innovation. The positive perceptions expressed by respondents indicate that digital transformation has begun to reshape administrative practices and organizational culture within the institution.

The study further reveals that digital ethics represents a critical enabling factor for sustainable digital government. Employees generally perceived that responsible information management, transparency, accountability, and data security have become increasingly integrated into daily administrative activities. This finding suggests that technological innovation alone is insufficient to strengthen public administration unless accompanied by ethical governance practices that ensure public trust and institutional legitimacy. The results are consistent with the ethical governance framework proposed by [36], which emphasizes that digital technologies should be implemented in ways that protect individual rights, promote transparency, and ensure accountability. Similarly, [37] argue that citizens' confidence in digital government largely depends on governments' ability to safeguard information and maintain ethical standards in digital service delivery.

The implementation of digital ethics also appears to influence organizational behavior by encouraging greater responsibility among civil servants in managing digital information and providing public services. Employees recognized that protecting confidential information, ensuring data accuracy, and utilizing digital systems responsibly are essential components of effective digital governance. These findings reinforce the argument of [38], who highlight that ethical digital leadership contributes significantly to successful digital transformation by promoting transparency, organizational accountability, and responsible innovation. Consequently, digital ethics should be regarded not as a complementary administrative principle but as a strategic governance mechanism supporting long-term bureaucratic reform.

Another important finding concerns the contribution of green computing to digital bureaucratic transformation. Respondents acknowledged that paperless administration, electronic documentation, and the optimization of digital resources have improved operational efficiency while simultaneously reducing resource consumption. Although environmental sustainability is often considered secondary to technological modernization, the findings indicate that environmentally responsible technology management contributes directly to organizational performance. These results support [39], who argues that green computing simultaneously promotes operational efficiency and environmental sustainability through responsible information technology management. Similarly, [40] demonstrate that sustainable technology utilization is becoming increasingly important as digital infrastructure continues to expand globally.

The integration of green computing into government administration also reflects a broader shift toward sustainable governance. Rather than focusing solely on administrative efficiency, digital transformation increasingly incorporates environmental considerations through reduced paper consumption, electronic document management, and energy-efficient digital infrastructure. This finding aligns with [41], who emphasizes that sustainable public administration requires governments to balance technological innovation with responsible environmental management. Therefore, green computing contributes not only to reducing operational costs but also to supporting broader sustainable development objectives within public sector organizations.

An important contribution of this study lies in demonstrating that digital ethics and green computing should not be viewed as separate organizational initiatives. Instead, both dimensions complement one another in strengthening digital bureaucratic transformation. Ethical digital governance establishes public trust by ensuring transparency, accountability, and information security, whereas green computing enhances organizational sustainability through efficient resource utilization and environmentally responsible technology management. This integrated perspective supports [42], who argues that the success of digital government depends on simultaneously addressing technological capability, ethical responsibility, and environmental sustainability. Accordingly, organizations that integrate these dimensions are more likely to achieve sustainable digital transformation than those emphasizing technological innovation alone.

The findings also have important implications for improving public service quality. Digital bureaucratic transformation enables faster administrative procedures, greater service accessibility, improved information transparency, and more responsive interactions between government institutions and citizens. Respondents perceived noticeable improvements in service effectiveness following the implementation of digital administrative systems, suggesting that technological innovation has generated tangible public value. These findings are consistent with previous studies indicating that digital government enhances organizational responsiveness, service efficiency, and citizen satisfaction by reducing bureaucratic complexity and facilitating real-time communication between governments and service users [43], [44].

Despite these positive developments, the study also indicates that sustaining digital bureaucratic transformation requires continuous organizational improvement. Future efforts should prioritize strengthening digital competencies among civil servants, expanding cybersecurity awareness programs, improving digital governance policies, and investing in environmentally sustainable digital infrastructure. Continuous institutional support is essential because digital transformation is an ongoing organizational process rather than a one-time technological initiative. From a theoretical perspective, this study enriches the digital government literature by demonstrating the complementary roles of digital ethics and green computing in supporting sustainable bureaucratic transformation. From a practical perspective, the findings provide evidence-based recommendations for local governments seeking to modernize public administration while simultaneously strengthening ethical governance and environmental sustainability. Consequently, integrating digital ethics and green computing offers a comprehensive strategy for developing a modern, accountable, citizen-oriented, and sustainable bureaucracy.

4. Conclusion

This study examined the role of digital ethics and green computing in supporting digital bureaucratic transformation at the West Sulawesi Provincial Plantation Office. The findings demonstrate that digital transformation extends beyond the adoption of information technology and represents a broader organizational change process involving administrative modernization, ethical governance, and environmental sustainability. The integration of digital ethics and green computing contributes to improving bureaucratic efficiency, strengthening transparency and accountability, and enhancing the quality of public services. These findings suggest that successful digital government depends not only on technological capability but also on the ability of public institutions to integrate ethical principles and sustainable technology management into everyday administrative practices.

From a theoretical perspective, this study contributes to the growing body of digital government literature by demonstrating that digital ethics and green computing are complementary dimensions of sustainable bureaucratic transformation. While digital ethics strengthens organizational legitimacy through responsible information management, transparency, and accountability, green computing supports long-term sustainability by promoting efficient resource utilization and environmentally responsible digital infrastructure. The study therefore extends previous research by highlighting the importance of simultaneously addressing technological, ethical, and environmental dimensions within public sector digital transformation.

From a practical perspective, the findings provide several implications for local government institutions. Strengthening digital ethics requires continuous efforts to improve data governance, cybersecurity awareness, transparency, and employee accountability in the use of digital technologies. At the same time, implementing green computing through paperless administration, energy-efficient digital infrastructure, and responsible electronic waste management can improve operational efficiency while supporting broader sustainability objectives. Local governments should therefore integrate these two approaches into their digital transformation strategies to build public trust and ensure that technological innovation contributes to both organizational performance and sustainable development.

This study has several limitations. The research was conducted within a single local government institution and relied primarily on employees' perceptions, which may limit the generalizability of the findings to other governmental contexts. In addition, the study focused on the organizational implementation of digital ethics and green computing without examining other factors that may influence digital transformation, such as leadership style, organizational culture, digital competencies, technological readiness, or institutional capacity.

Future research is encouraged to examine digital bureaucratic transformation across multiple government institutions and administrative sectors to enable broader comparative analysis. Researchers may also employ mixed-method or quantitative approaches to investigate causal relationships among digital ethics, green computing, organizational capability, and public service performance. Furthermore, incorporating additional variables—such as digital leadership, innovation capability, employee digital competence, organizational

resilience, and citizen trust—would provide a more comprehensive understanding of the factors shaping sustainable digital governance. Such studies would further enrich the literature on digital public administration and provide stronger evidence for developing effective digital government policies.

References

- [1] R. Wujarso, A. R. Hakim, N. Faizah, V. Yasin, and R. Andhityara, “Digital Transformation in Public Sector Institutions: A Systematic Literature Review and Comparative Country Analysis,” *AL-ISHLAH: Jurnal Pendidikan*, vol. 17, no. 4, Dec. 2025, doi: 10.35445/alishlah.v17i4.8765.
- [2] L. Espina-Romero, A. Ochoa-Díaz, L. Pico Versoza, F. Arias-Montoya, and J. Izaguirre Olmedo, “Building Digital Governance Capacity for Digital Transformation in Public Administration: Evidence from Lima, Peru,” *Adm. Sci.*, vol. 16, no. 6, p. 281, Jun. 2026, doi: 10.3390/admsci16060281.
- [3] B. Ly, R. Ly, and S. Ma, “Digital transformation and flexibility in public services: Knowledge, culture and digital infrastructures,” *Journal of Innovation & Knowledge*, vol. 13, p. 100947, May 2026, doi: 10.1016/j.jik.2026.100947.
- [4] S. Wahyudi, A. Yusup, and M. R. Perdana, “Analysis of digital transformation of public administration in improving the effectiveness of government services in Indonesia,” *Jurnal Konseling dan Pendidikan*, vol. 13, no. 3, pp. 574–585, Dec. 2025, doi: 10.29210/1183900.
- [5] S. Ahmad, U. Hamim, and D. I. Y. Solihin, “Implementasi Digitalisasi Pelayanan Publik untuk Meningkatkan Akuntabilitas Pemerintah di Kota Gorontalo,” *MIMBAR: Jurnal Sosial dan Pembangunan*, pp. 189–196, Dec. 2025, doi: 10.29313/mimbar.v41i2.8606.
- [6] S. Syafarudin and H. Abd, “Digital Transformation in Public Services,” *International Journal of Law and Society*, vol. 2, no. 4, pp. 169–179, Nov. 2025, doi: 10.62951/ijls.v2i4.797.
- [7] T. Prasodjo, “Rethinking Bureaucracy in the Digital Era: A Qualitative Review of Public Sector Transformation in Indonesia,” *Golden Ratio of Social Science and Education*, vol. 5, no. 2, pp. 290–301, Jun. 2025, doi: 10.52970/grsse.v5i2.1425.
- [8] S. R. Virnandes, J. Shen, and E. Vlahu-Gjorgievska, “Building public trust through digital government transformation: A qualitative study of Indonesian civil service agency,” *Procedia Comput. Sci.*, vol. 234, pp. 1183–1191, 2024, doi: 10.1016/j.procs.2024.03.114.
- [9] G. Vial, “Understanding digital transformation: A review and a research agenda,” *The Journal of Strategic Information Systems*, vol. 28, no. 2, pp. 118–144, Jun. 2019, doi: 10.1016/j.jsis.2019.01.003.
- [10] I. Mergel, N. Edelman, and N. Haug, “Defining digital transformation: Results from expert interviews,” *Gov. Inf. Q.*, vol. 36, no. 4, p. 101385, Oct. 2019, doi: 10.1016/j.giq.2019.06.002.
- [11] E. Adelia, Haliah, and A. Kusumawati, “Digital Ethics and Public Trust in the Era of Government Digital Transformation,” *IJEVSS*, vol. 4, no. 2, pp. 142–161, 2025.
- [12] D. P. S. Ramadhani, H. R. Sulaiman, A. W. Anggraeni, and S. Aisyah, “The Effectiveness of E-Government Services in Enhancing Public Trust: A Comparative Study Across ASEAN Countries,” *Journal of Management and Informatics*, vol. 4, no. 1, pp. 649–667, Apr. 2025, doi: 10.51903/jmi.v4i1.150.
- [13] E. Angelaki, A. Garefalakis, M. Kourgiantakis, I. Sitzimis, and I. Passas, “ESG Integration and Green Computing: A 20-Year Bibliometric Analysis,” *Sustainability*, vol. 17, no. 7, p. 3266, Apr. 2025, doi: 10.3390/su17073266.
- [14] J. C. Ugonna, O. O. Olaniyi, F. G. Olaniyi, A. A. Arigbabu, and T. O. Oladoyinbo, “Towards Sustainable IT Infrastructure: Integrating Green Computing with Data Warehouse and Big Data Technologies to Enhance Efficiency and Environmental Responsibility,” *Journal of Engineering Research and Reports*, vol. 26, no. 5, pp. 247–261, Apr. 2024, doi: 10.9734/jerr/2024/v26i51151.
- [15] A. A. Guenduez, M. A. Demircioglu, E. M. Mueller, and E. Cinar, “Digital innovation strategies in the public sector,” *Res. Policy*, vol. 54, no. 8, p. 105274, Oct. 2025, doi: 10.1016/j.respol.2025.105274.
- [16] R. Purnamasari, A. I. Hasanudin, R. Zulfikar, and H. Yazid, “Technological infrastructure and financial resource availability in enhancing public services and government performance: The role of digital innovation adoption in Indonesia,” *Social Sciences & Humanities Open*, vol. 11, p. 101621, 2025, doi: 10.1016/j.ssaho.2025.101621.
- [17] O. Nurti, Z. A. Putri, and T. Darmi, “Implementing Digital Public Services in Local Government: Evidence from Bengkulu City, Indonesia,” *Mimbar: Jurnal Penelitian Sosial dan Politik*, vol. 15, no. 1, pp. 106–122, 2026.
- [18] T. Y. P. Habsana, D. S. Kencono, and H. D. Fridayani, “Implementation Challenges of Indonesia’s Electronic-Based Government System: An Edwards III Perspective,” *Jurnal Pemerintahan dan Kebijakan (JPK)*, vol. 7, no. 2, pp. 168–180, Apr. 2026, doi: 10.18196/jpk.v7i2.29243.

- [19] B. Kasim, D. Ferriswara, and E. Haryati, "Digital Transformation In Public Services : A Literature Review On Bureaucratic Innovation And Adaptation In The Era Of Digital Government," *International Journal of Social Science and Humanity*, vol. 2, no. 4, pp. 105–110, Dec. 2025, doi: 10.62951/ijss.v2i4.523.
- [20] R. Wujarso, A. R. Hakim, N. Faizah, V. Yasin, and R. Andhitiyara, "Digital Transformation in Public Sector Institutions: A Systematic Literature Review and Comparative Country Analysis," *AL-ISHLAH: Jurnal Pendidikan*, vol. 17, no. 4, Dec. 2025, doi: 10.35445/alishlah.v17i4.8765.
- [21] A. A. Guenduez, N. Walker, and M. A. Demircioglu, "Digital ethics: Global trends and divergent paths," *Gov. Inf. Q.*, vol. 42, no. 3, p. 102050, Sep. 2025, doi: 10.1016/j.giq.2025.102050.
- [22] T. Prasodjo, "Public Trust Reloaded: The Impact of Data Transparency and Digital Participation on Government Legitimacy in the Era of Open Government," *Golden Ratio of Social Science and Education*, vol. 6, no. 1, pp. 53–67, Dec. 2025, doi: 10.52970/grsse.v6i1.1894.
- [23] C. A. Merlano, "Digital Leadership and Transformation in Contemporary Times," *International Journal of Digital Strategy, Governance, and Business Transformation*, vol. 13, no. 1, pp. 1–20, Aug. 2024, doi: 10.4018/IJDSGBT.352047.
- [24] B. Pal, "Green Computing: Strategies For Sustainable Information Technology," *Int. J. Environ. Sci.*, pp. 455–457, Jul. 2025, doi: 10.64252/qjh6v370.
- [25] X. Zheng, T. Liu, and W. Xu, "Impact of information and communication technology development on China's carbon emissions," *Journal of Innovation & Knowledge*, vol. 10, no. 5, p. 100769, Sep. 2025, doi: 10.1016/j.jik.2025.100769.
- [26] L. Chen, T. Dai, C. Zhang, and Z. Zhang, "Digital government and corporate ESG performance," *International Review of Financial Analysis*, vol. 105, p. 104379, Sep. 2025, doi: 10.1016/j.irfa.2025.104379.
- [27] M. K. Khalil and M. Ali, "Digital Governance in the ESG Era: Enhancing Transparency, Accountability, and Sustainability," in *Digital Evolution of ESG 3.0*, Emerald Publishing Limited, 2026, pp. 17–32. doi: 10.1108/978-1-83662-758-620261002.
- [28] R. Martínez, "Digital Governance and Personal Data Protection: Proposals for an Ethical Public Transformation through the Privacy-by-Design Approach," *Salud, Ciencia y Tecnología - Serie de Conferencias*, vol. 4, p. 1782, Jul. 2025, doi: 10.56294/sctconf20251782.
- [29] O. Pricopoaia, N. Cristache, A. Lupașc, and D. Iancu, "The implications of digital transformation and environmental innovation for sustainability," *Journal of Innovation & Knowledge*, vol. 10, no. 3, p. 100713, May 2025, doi: 10.1016/j.jik.2025.100713.
- [30] Creswell John W, *RESEARCH DESIGN: Qualitative, Quantitative, and Mixed Methods Approaches*, 4th ed. California: SAGE, 2014.
- [31] R. K. Yin, *Case Study Research and Applications: Design and Methods*, 6th ed. SAGE Publications, Inc, 2017.
- [32] M. Q. Patton, *Qualitative Evaluation Methods*. Beverly Hills: Sage Publication, 1987.
- [33] L. A. Palinkas, S. M. Horwitz, C. A. Green, J. P. Wisdom, N. Duan, and K. Hoagwood, "Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research," *Administration and Policy in Mental Health and Mental Health Services Research*, vol. 42, no. 5, pp. 533–544, Sep. 2015, doi: 10.1007/s10488-013-0528-y.
- [34] M. B. Miles and A. M. Huberman, *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks: Sage, 1994.
- [35] Y. S. Lincoln and E. G. Guba, *Naturalistic Inquiry*. SAGE, 1985.
- [36] Lazor, Oksana Lazor, Ivan Zubar, Andriy Zabolotnyi, and Iryna Yunyk, "The Impact of Digital Technologies on Ensuring Transparency and Minimising Corruption Risks among Public Authorities," *Pakistan Journal of Criminology*, no. 16.2, pp. 357–374, Apr. 2024, doi: 10.62271/pjc.16.2.357.374.
- [37] O. Ndzabela, Y. Lukman, and K. Yakobi, "Citizen Trust in E-Government Strategies," *International Journal of Public Administration in the Digital Age*, vol. 12, no. 1, pp. 1–28, Jul. 2025, doi: 10.4018/IJPADA.385699.
- [38] D. Hariyani, P. Hariyani, and S. Mishra, "The role of leadership in sustainable digital transformation of the organization," *Sustainable Futures*, vol. 10, p. 101130, Dec. 2025, doi: 10.1016/j.sfr.2025.101130.
- [39] Mohammed Swaleh and Franklin Wabwoba, "Green Computing: A Comprehensive Review of Sustainable IT Practices," *International Journal of Computer Applications Technology and Research*, vol. 12, no. 12, pp. 48–71, Dec. 2023, doi: 10.7753/IJCATR1212.1009.

- [40] A. A. Atieh, A. F. Hijazin, S. M. Alshdaifat, and E. F. Hasan, "Digital transformation and technological capabilities in achieving sustainable development goals in emerging countries," *Discover Sustainability*, vol. 7, no. 1, p. 383, Feb. 2026, doi: 10.1007/s43621-026-02739-3.
- [41] B. Pini, A. Petroni, and B. Bigliardi, "Technological Innovation and Sustainability in Public Administration: A Systematic Review and Research Agenda," *Adm. Sci.*, vol. 16, no. 2, p. 80, Feb. 2026, doi: 10.3390/admsci16020080.
- [42] G. H. Djatmiko, O. Sinaga, and S. Pawirosumarto, "Digital Transformation and Social Inclusion in Public Services: A Qualitative Analysis of E-Government Adoption for Marginalized Communities in Sustainable Governance," *Sustainability*, vol. 17, no. 7, p. 2908, Mar. 2025, doi: 10.3390/su17072908.
- [43] Reynilda, A. R. Nugraha, Umar Sako, and A. Wibasuri, "Governance Innovation Through E-Government Platforms: A Study On Service Efficiency And Citizen Satisfaction," *JHSS*, vol. 9, no. 3, pp. 276–279, Dec. 2025, doi: 10.33751/jhss.v9i3.120.
- [44] F. Hulu, R. Purbandono H, Suryadi, and I. Wook, "Digital Bureaucracy and Public Sector Efficiency: Exploring The Transformation of Government Operations," *VISIONER : Jurnal Pemerintahan Daerah di Indonesia*, vol. 17, no. 2, pp. 12–23, Aug. 2025, doi: 10.54783/jv.v17i2.1417.