

Developing a Human Resource Management Model for E-Government Implementation in the Public Sector

Human Resource
Management Model to
Support E-Government

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ABSTRACT

The rapid digital transformation in Indonesia requires public agencies to align human resource (HR) capabilities with e-government reforms. This study aims to develop a conceptual HR management model for the public sector to support effective e-government implementation. An exploratory qualitative approach was used, and a multi-level case study was conducted on the State Civil Service Agency (SAPK) and the Ministry of Law (SIMPEG). Data were obtained through in-depth interviews, document analysis, and field observations, then thematically analyzed using NVivo. The results highlight HR's role as an enabler, integrator, and catalyst for change. SAPK and SIMPEG have improved efficiency, but challenges remain, including low digital literacy, resistance to change, fragmented policies, and limited regional budgets, which hinder interoperability and sustainability of public digital services. The proposed integrative HR management model comprises five pillars: digital competence, adaptive structure, digital governance, supporting infrastructure, and digital organizational culture. Policy recommendations include targeted digital training, integrated personnel systems, dedicated budget allocations, and HR regulatory reform. This model provides a strategic roadmap for national and regional agencies to develop a capable, efficient, transparent, and service-oriented bureaucracy in the digital era.

Keywords: Digital Competence, Digital Transformation, E-Government, Human Resource Management, Policy Integration, Public Sector.

ABSTRAK

Transformasi digital yang pesat di Indonesia menuntut lembaga publik untuk menyelaraskan kapabilitas sumber daya manusia (SDM) dengan reformasi e-government. Studi ini bertujuan untuk mengembangkan model manajemen SDM konseptual bagi sektor publik guna mendukung implementasi e-government yang efektif. Dengan menggunakan pendekatan kualitatif eksploratif, studi kasus multi-level dilakukan pada Badan Kepegawaian Negara (SAPK) dan Kementerian Hukum (SIMPEG). Data diperoleh melalui wawancara mendalam, analisis dokumen, dan observasi lapangan, kemudian dianalisis secara tematik menggunakan NVivo. Hasilnya menyoroti peran SDM sebagai enabler, integrator, dan katalisator perubahan. Meskipun SAPK dan SIMPEG telah meningkatkan efisiensi, tantangan tetap ada, termasuk literasi digital yang rendah, resistensi

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terhadap perubahan, kebijakan yang terfragmentasi, dan anggaran daerah yang terbatas, yang menghambat interoperabilitas dan keberlanjutan layanan digital publik. Model manajemen SDM integratif yang diusulkan terdiri dari lima pilar: kompetensi digital, struktur adaptif, tata kelola digital, infrastruktur pendukung, dan budaya organisasi digital. Rekomendasi kebijakan meliputi pelatihan digital yang terarah, sistem kepegawaian terintegrasi, alokasi anggaran khusus, dan reformasi regulasi SDM. Model ini menyediakan peta jalan strategis bagi lembaga nasional dan regional untuk mengembangkan birokrasi yang cakap, efisien, transparan, dan berorientasi layanan di era digital.

Kata kunci: E-Government, Kompetensi Digital, Transformasi Digital, Integrasi Kebijakan, Manajemen Sumber Daya Manusia, Sektor Publik.

INTRODUCTION

Digital transformation in the Indonesian public sector has emerged as a strategic agenda to enhance governance quality and public services through e-government, aiming for greater efficiency, transparency, and accountability (Mapanoo & Caballero, 2018; Nagel, 2024). A key dimension of this transformation is adaptive human resource (HR) management, supported by technologically advanced systems such as Personnel Services Application System (*Sistem Aplikasi Pelayanan Kepegawaian/SAPK*), which enable real-time employee data management and reduce administrative errors (Morgan & Stanley, 2012). Notable progress has been made, but significant barriers persist. Infrastructure disparities between urban and rural areas create unequal technology access (Cavalheiro & Joia, 2016; Mutiarin et al., 2024). Low digital literacy and bureaucratic resistance further impede adoption (Bilan et al., 2023). The absence of comprehensive personal data protection regulations until 2022 has created legal gaps in digital governance (Wagola et al., 2023), while the fragmentation of inter-agency systems and the lack of interoperability standards limit data integration (Metcalf & Papageorgiou, 2022).

The success of e-government initiatives depends not only on technological infrastructure but also on the readiness and capacity of human resources (Heeks & Bailur, 2007). In Indonesia, disparities in the competencies of civil servants (*Aparatur Sipil Negara/ASN*) are stark, particularly in remote areas. Data from the Central Statistics Agency (BPS) indicate that approximately 60% of regional ASNs lack adequate IT competency (Eko Wahyudie et al., 2025). Without systematic HR capacity-building, e-government risks becoming an underutilized and ineffective investment. Moreover, entrenched resistance to change among civil servants accustomed to manual systems poses additional challenges (Alwaelye et al., 2024). Conditions such as these exacerbate the “design–reality gap” between system design and practical implementation (Heeks, 2002; Zahra et al., 2017; Yin, 2018). Addressing these issues requires continuous training, reskilling, and the cultivation of an adaptive digital work culture (Herawati, 2021), as well as strengthening HR management for e-government designers, implementers, and evaluators as a foundation for digital-based bureaucratic reform.

However, current HR management in Indonesian e-government initiatives remains fragmented. Supported by SAPK, there is no integrated managerial framework linking competencies, organizational culture, regulations, and infrastructure. Existing studies tend to focus on technical or individual factors in isolation. For instance, Bilan et al. (2023) highlight low ASN digital readiness but do not propose a structural competency enhancement strategy, while Alwaely et al. (2024) discuss resistance to change without situating it within a long-term adaptive HR strategy. At the policy level, the absence of a national standard for a digital HR management system undermines inter-agency interoperability, and fragmented personnel information systems result in data inconsistencies and delayed decision-making (Wagola et al., 2023; Rachman Wintarto, 2024).

Experiences demonstrate that hybrid models integrating digital HRM, knowledge management, and organizational change can serve as a foundation for e-government

transformation (Breugh & Nõmmik, 2024; Khoeinie et al., 2024). Yet, Indonesia lacks a contextualized, empirically grounded model that incorporates digital competence, adaptive readiness, incentives, institutional reform, and integrated regulatory support. This gap underscores the need for a conceptual and operational HR model that aligns technological readiness with human capacity while fostering synergy between policy, infrastructure, and organizational culture (Abouhallajet et al., 2024).

Given the persistent gaps in HR capability, policy integration, and organizational culture, there is a pressing need for a holistic HR management framework tailored to Indonesia's public sector e-government context. Such a model would address technical competency gaps, mitigate resistance to change, and ensure interoperability across agencies. By situating HR as an enabler, integrator, and catalyst for change, this research responds to both practical and theoretical needs offering actionable recommendations for policymakers and enriching the academic discourse on digital transformation in the public sector.

This study aims to formulate and develop an integrative HR management model to support e-government implementation in Indonesia's public service sector, particularly within the Ministry of Immigration and Corrections. It seeks to explore how managerial aspects such as digital competence, training, leadership, regulatory frameworks, and infrastructure readiness can be synergized to strengthen bureaucratic digital transformation. The central research question is: What constitutes an effective and sustainable HR management model to support e-government implementation in the Ministry of Immigration and Corrections, and what are the key enabling and inhibiting factors for its success?

LITERATURE REVIEW

Theory of E-Government

E-government is a concept that refers to the use of Information and Communication Technology (ICT) by public institutions to improve efficiency, transparency, participation, and the quality of public services. In the context of modern public administration, e-government is understood not only as the digitization of bureaucratic processes but also as a citizen-focused transformation of government. According to Heeks and Bailur (2007), e-government consists of interactions between actors, institutions, and technology within a specific socio-political space, emphasizes the importance of understanding the design-reality gap, namely the difference between e-government system planning and the reality on the ground, which is often a major cause of implementation failure. In Indonesia, this gap is reflected in the lack of alignment between the design of the digital civil service system and the actual competencies of civil servants and the readiness of regional infrastructure (Eko Wahyudi et al., 2025).

Moon (2000) offers an evolutionary approach to e-government that encompasses five stages: information, interaction, transaction, integration, and transformation. Many institutions in Indonesia are still in the early stages of interaction or transactions and have not yet fully entered the integration and transformation phase due to limited human resources and supporting technological systems (Mutiarin et al., 2024). Shakya (2017) outlined the main principles of e-government, including efficiency, effectiveness, transparency, participation, and responsiveness, which can be used to assess the contribution of e-government to bureaucratic reform and improve the quality of public services. The success of e-government implementation is greatly influenced by non-technical factors, particularly human resource readiness, organizational culture, and policy support (Hesse-Biber, 2010; Bilan et al., 2023; Breugh & Nõmmik, 2024). Therefore, e-government implementation must be complemented by an integrated managerial strategy that is adaptive to the local context, including training, digital leadership, and HR regulatory reform.

Policy Implementation Theory

The policy implementation theory developed by Sabatier and Mazmanian (1980) is one of the classic conceptual frameworks in public policy studies. This theory emphasizes that successful policy implementation depends not only on the quality of its formulation but also on its implementation within a complex political, administrative, and social context. Sabatier and Mazmanian (1980) identified three key prerequisites for successful policy implementation such as clarity and consistency of policy objectives, adequate identification of policy causality, and a robust implementation structure, including the availability of resources and support from implementing actors.

In the context of e-government, these three prerequisites are particularly relevant. Although Indonesia has formulated various digital transformation initiatives across various public sectors, implementation on the ground is often hampered by regulatory fragmentation, budget constraints, and a lack of human resource capacity (Wagola et al., 2023; Aboulhallaj et al., 2024). This theory also highlights the importance of coordination between implementing actors (multi-level governance), including the involvement of the central government, local governments, and internal organizational work units. Case studies of e-government implementation in Indonesia show that the gap between central and regional governments, particularly in technology and human resource training, constitutes a significant structural barrier (Aminah & Saksono, 2021a; Mutiarin et al., 2024).

Lack of coordination and unequal resource allocation often result in e-government policies being effective only in regions with high capacity. This theory also emphasizes the importance of political support and leadership commitment as external factors influencing the implementation process. In human resource-based e-government implementation, the role of visionary bureaucratic leaders is crucial in driving organizational culture change and the adoption of digital systems (Fredriksen et al., 2021). Sabatier and Mazmanian's (1980) approach provide a strong theoretical foundation for analyzing the complexities of e-government policy implementation in Indonesia, particularly from the perspective of institutional capacity, regulations, human resources, and government structure.

Digital HR Management Theory

In the era of digital transformation, Human Resource Management (HRM) in the public sector is inseparable from an organization's digitalization strategy. Digital HRM theory emphasizes the importance of integrating information technology, developing digital competencies, and adapting organizational structures and cultures to create an agile, competent, and innovative bureaucracy. According to Breugh and Nõmmik (2024), HRM in the context of digital government must focus on two key aspects: coordination across digital platforms and employee adaptability to new technologies. They highlight that an e-government HRM system that supports e-government requires more than just adopting technology; it also requires collaborative work patterns between units and leadership support to foster internal and external synergy. In Indonesia, this is relevant to the need for integration of personnel information systems between institutions, which still face fragmentation (Nowell et al., 2017; Metcalf & Papageorgiou, 2022; Aboulhallaj et al., 2024).

Meanwhile, Vasilieva et al. (2018) emphasize the importance of developing the digital competencies of Civil Servants through e-learning-based training and a lifelong learning approach. Their research in Russia showed that high digital literacy among state officials significantly increased the effectiveness of e-government implementation. Challenges were also found in Indonesia, where most civil servants, especially in the regions, still have limited digital competencies (Herawati, 2021; Eko Wahyudi et al., 2025). Zulkifli et al. (2025) emphasized that the success of digital HR management is significantly influenced by digital leadership, organizational agility, and the institution's ability to innovate through information systems integration. These findings can be applied to the broader public sector context, including government bureaucracies. In conclusion, digital

HR management is not only about improving individual competencies but also about systemic transformation in organizational structures, work patterns, and public leadership (Aminah & Saksono, 2021b; Alwaely et al., 2024).

Information Systems Success Model

The information system success model developed by DeLone and McLean (2004) is one of the most influential frameworks for evaluating the success of information systems, including e-government systems. This model consists of six key interacting dimensions: system quality, information quality, service quality, usage, user satisfaction, and “net benefits” (Anaam et al., 2023). In the context of e-government implementation in the public sector, this model is highly relevant for assessing the effectiveness of digital systems such as the SAPK and the Personnel Management Information System (*Sistem Informasi Manajemen Kepegawaian/SIMPEG*). Quality of service and information quality contribute to the reliability and accuracy of administrative processes, while user satisfaction and frequency of use reflect the acceptance and adaptation of officials to new systems (Pappel et al., 2017; Ivashkevich et al., 2022). In Indonesia, e-government systems are often not optimally utilized due to limited employee digital literacy and limited infrastructure (Herawati, 2021; Mutiarin et al., 2024).

The net benefit dimension in this model can be interpreted as increased service efficiency, transparency in HR management, and reduced administrative costs. Research by Prasad and De (2024) shows that successful information systems increase internal and external trust in institutional governance, which is a crucial component of technology-based bureaucratic reform. The application of this model implicitly emphasizes increased efficiency, reduced administrative errors, and increased public trust in digital personnel systems (Eko Wahyudi et al., 2025; Zulkifli et al., 2025). However, no research in the Indonesian context has explicitly adapted the DeLone and McLean (2004) model to design a performance evaluation system for HR-based e-government platforms. Therefore, the integration information system success model in this study provides an important conceptual contribution to systematically assessing and formulating indicators for the success of digital human resource management, as well as strengthening the policy direction for developing an integrated personnel system in Indonesia.

Research in Indonesia and Global

Extensive research has been conducted on e-government implementation and Human Resource Management (HRM) management in the public sector, both globally and in Indonesia. Generally, these studies demonstrate that digital transformation in government is inseparable from technological readiness, managerial strategies, and human resource capacity that sustainably support digital systems (Heeks, 2002; OECD, 2020). At the global level, research by Breaugh and Nõmmik (2024) indicates that the success of digitalizing government platforms is largely determined by inter-agency coordination, administrative traditions, and the readiness of HR management systems to adapt to the complexities of new technologies. Meanwhile, research by Madanchian and Taherdoost (2025) highlights that technology adoption in public HR management requires support from digital leadership, innovative strategies, and organizational adaptation mechanisms.

In the Indonesian context, various studies demonstrate the challenges and successes of e-government implementation. The National Civil Service Agency (*Badan Kepegawaian Negara/BKN*) has developed a SAPK, and the Ministry of Law has developed a SIMPEG, which enables digital and real-time employee data management (Pappel et al., 2017). However, research by Mutiarin et al. (2024) revealed that the implementation of digital systems such as SAPK still faces significant obstacles in remote areas, particularly related to infrastructure, digital literacy, and operational budgets. Bilan et al. (2023) emphasized that HR readiness in the e-society era requires a holistic approach that includes technical training, change management, and professional incentives. Research by Wagola et al. (2023) and Aboulhallaj et al. (2024) shows that Indonesia still lacks a comprehensive

regulatory framework to support an integrated digital HR system, resulting in fragmented personnel data across institutions. This study seeks to fill the gap between theory and practice by developing an integrative HR management model that can support e-government in the public service sector of the Ministry of Law.

RESEARCH METHODS

This study employed an exploratory qualitative approach to gain an in-depth understanding of Human Resource Management (HRM) dynamics in supporting e-government implementation within the public service sector. This approach was considered appropriate because the issues examined are complex, context-specific, and have not been extensively explained in existing theoretical or empirical literature. A case study strategy was adopted to enable detailed exploration of digital HRM practices across central and regional government institutions.

Data were collected through three main techniques: in-depth interviews, direct observation, and document analysis. Interviews were conducted with key officials from the National Civil Service Agency (BKN), the Ministry of Administrative and Bureaucratic Reform (KemenPAN-RB), and the Ministry of Law. These interviews explored perceptions, experiences, and strategies related to digital HRM implementation. A practical examination of the use of e-government systems, such as the SAPK, was undertaken to manage administrative processes. The analysis focused on reviewing relevant regulations, technical guidelines, and institutional reports to provide additional context and corroborate interview and observational findings. Purposive sampling was applied to ensure the selection of respondents who play central roles in e-government initiatives. Collection of data instruments included a semi-structured interview guide, an observation checklist, and a document review template.

Thematic analysis was used to identify recurring patterns, themes, and categories emerging from the data. NVivo qualitative analysis software supported the coding process, allowing for efficient organization and retrieval of information from interview transcripts, policy documents, and observation notes. NVivo's features such as automated text classification, manual coding, and visualization tools (e.g., word frequency charts and coding tree diagrams) were used to systematically map relationships between concepts and ensure consistency in theme development. This facilitated triangulation between data sources, improving both the transparency and credibility of the analysis.

Through this methodological framework, the research sought to produce a nuanced understanding of how digital HRM systems operate within the broader context of e-government in Indonesia, highlighting both institutional practices and systemic challenges.

RESULTS

Efficiency and Transparency through SAPK and Data Integration

One of the key findings of this study indicates that the implementation of the Personnel Service Application System (SAPK) developed by the National Civil Service Agency (BKN) and the Personnel Management Information System (SIMPEG) created by the Ministry of Law has significantly improved the efficiency and transparency of human resource administration in the public sector. These applications enable real-time, integrated management of civil servant (ASN) data, accelerating administrative processes from appointments, transfers, promotions, and retirement. Observations and interviews with civil servant officials at BKN and the Ministry of Law indicate that prior to digitization, the civil servant administration process often took weeks due to manual verification and multiple bureaucratic processes. With SAPK and SIMPEG, this timeframe has been significantly reduced to 1-3 working days for data input and validation, provided the infrastructure and staff competency are adequate.

In terms of transparency, SAPK and SIMPEG provide user agencies with access to monitor the status of civil servant administration online, minimizing the opportunity for personnel data manipulation and increasing employee trust in a more objective and

accountable management system. According to Pappel et al. (2017), digitizing personnel documents helps strengthen internal audit mechanisms and reduces the potential for abuse of authority. However, a study by Mutiarin et al. (2024) found that regions with limited internet connections and untrained human resources still experience delays in data input. These findings suggest that while the use of digital systems such as SAPK improves efficiency, a more robust strategy is needed to improve human resource capacity and interoperability between institutions.

HR Limitations and Policy Gaps in E-Government Implementation

The study reveals that e-government adoption in public sector human resource (HR) management is hindered by two interrelated challenges: human capital constraints and regulatory fragmentation. First, the quality of civil servants (ASN) in terms of digital literacy, adaptability to change, and access to effective training remains uneven. In remote regions, only around 43.6% of ASN possess basic to intermediate digital skills, limiting the effective use of systems such as SAPK and SIMPEG. Cultural resistance also persists, with many ASN expressing discomfort with digital oversight and changes in work routines (Aminah & Saksono, 2021; Alwaely et al., 2024). Technology training is often too theoretical and poorly aligned with operational needs, reducing user confidence (Herawati, 2021).

Second, the regulatory environment lacks cohesion. While Presidential Regulation No. 95/2018 on Electronic-Based Government Systems (SPBE) provides a general framework, it does not detail technical mechanisms for integrated digital HR management, prompting agencies to develop disparate systems (Metcalf & Papageorgiou, 2022; Aboulhallaj et al., 2024). Implementation of Law No. 27/2022 on Personal Data Protection is also weak, with only 19 out of 200+ agencies having internal data protection policies. Furthermore, decentralization has not been accompanied by standardized digital competency benchmarks for ASN, creating regional disparities (Mutiarin et al., 2024).

These findings suggest that without targeted competency development, structured change management, and a comprehensive legal-operational framework, digital HR systems risk becoming symbolic initiatives with minimal impact on bureaucratic efficiency, security, and equity.

Thematic Findings: Budget and Infrastructure Constraints

An important finding in this study is that budget and infrastructure limitations are significant obstacles to the equitable implementation of e-government and digital Human Resource (HR) management across Indonesia. Interviews with officials at the Ministry of Law indicate that budget allocations for HR development, technology training, and digital system updates remain relatively low, particularly in Technical Implementation Units (*Unit Pelaksana Teknis/UPT*). According to Haryadi (2021), based on findings from Bappenas (2022), of the total national ICT spending of IDR 7.7 trillion, only 19.4% was allocated to the HR management sector and digital training for civil servants. Most of the budget is focused on physical infrastructure and hardware procurement, rather than on strengthening human capacity or updating personnel information systems. Furthermore, uneven distribution of information and communication technology (ICT) infrastructure across regions is a major challenge, with more than 14,000 villages and sub-districts still lacking adequate internet access. This leads to delays in data input into the SIMPEG and SAPK systems. Rachmawati et al. (2023) noted that government institutions with weak infrastructure tend to be stuck in a stagnant digitalization phase, continuing to use manual systems for civil servant (ASN) management processes. These budget and infrastructure limitations are the root cause of the disparity in e-government implementation between regions. Without adequate budget support and equitable ICT infrastructure development, the digitalization of human resource management in the public sector risks becoming symbolic and lacking a systemic impact on improving bureaucratic efficiency and accountability.

Thematic Findings: Informant Narrative (Direct and Thematic Quotes)

This exploratory qualitative research, through in-depth interviews with HR officials and staff from the National Civil Service Agency (BKN), the Ministry of Administrative and Bureaucratic Reform (PAN-RB), and the Ministry of Law, revealed key narratives about e-government implementation in human resource management. Informant A from the Ministry of Law noted reliance on technology-savvy individuals. Informant B from BKN pointed to negative perceptions of digital systems due to poor infrastructure, fostering subtle resistance. Informant C, Head of the Civil Service Bureau, raised concerns about unclear responsibilities in protecting civil servant data, hampering adoption. Informant D from the Ministry of Communication and Digital criticized overly general training, with 60.8% of participants feeling less confident in using applications (Herawati, 2021). Informant E from PAN-RB stressed the need for better integration, given a SPBE data interoperability score of only 2.05/5. These findings indicate that digital HR challenges are technical, structural, and cultural, involving regulatory, competency, and mindset issues.

Table 1 shows how using this matrix helps identify areas for improvement and formulate digital HR policy strategies. For example, while systems like SAPK demonstrate positive efficiency results, regulatory and digital literacy gaps are major obstacles to the sustainability of e-government-based digital transformation.

Table 1. Matrix of Finding and Concepts

Thematic	Theoretical Concepts	Supporting Data	Gap/Critical Notes
ASN digital literacy is still low and uneven between regions	Digital HRM Theory (Breugh & Nömmik, 2024)	BPS (2022): Only 43.6% of civil servants outside Java have basic-intermediate digital literacy	There is a need for a national digital literacy certification system.
ASN's resistance to the e-gov system due to low understanding and involvement	Kotter's Change Management	Mutiarin et al. (2024): The highest resistance comes from ASN aged >45 years	There is no change communication strategy that targets vulnerable groups
Technology training is not sustainable and too common	Adult Learning Theory; e-Gov Success Factors (Heeks)	Herawati (2021): 60.8% of civil servants feel that training is not applicable enough	Work context-based training and hands-on practice required
SAPK and SIASN systems have been proven to improve administrative efficiency	DeLone & McLean IS Success Model	BKN (2022): Data processing time efficiency increased by 37%	Effectiveness is still limited to agencies with human resources & supporting infrastructure
Fragmentation of regulations and policies between agencies	Policy Implementation Theory (Sabatier & Mazmanian, 1980)	Kominfo (2023): Only 19 agencies have internal regulations for PDP ASN	Need for an integrative national policy on digital human resources
ICT infrastructure is uneven between regions	E-Government Readiness Index (UN, World Bank)	Kominfo (2023): >14,000 villages have not been reached by stable internet	Need to affirm ICT infrastructure spending in disadvantaged regions
ASN's expectations for an integrated HR system	Interoperability Governance	National SPBE Report (2022): Interoperability score is only 2.05/5	System fragmentation is still dominant (e-performance, presence, SIASN is not fully connected)

DISCUSSION

The findings of this study reaffirm that the effectiveness of e-government implementation in Indonesia's public sector is closely tied to the quality of human resource (HR) management. Determinants include digital literacy, organizational readiness, regulatory coherence, and infrastructure adequacy (Davis, 1989). The low level

of digital literacy among civil servants (ASN), particularly outside major urban centers, is consistent with Digital HRM theory and the Technology Acceptance Model, which emphasizes perceived ease of use and perceived usefulness as drivers of technology adoption (Breugh & Nömmik, 2024). Resistance to change and dependence on a small group of tech-savvy staff also reflect organizational culture barriers highlighted in Kotter's Change Management framework (Nelson-Brantley & Ford, 2017).

The identified policy fragmentation and weak interoperability between systems such as SAPK and SIMPEG resonate with the "Design–Reality Gap" model (Heeks, 2002), where misalignment between central policy design and local implementation realities hampers system effectiveness. The lack of uniform data protection policies despite the enactment of the Personal Data Protection Law demonstrates the gap between regulatory formulation and operational enforcement, consistent with Sabatier and Mazmanian's (1980) policy implementation model. These conditions reinforce that e-government initiatives cannot rely solely on technological upgrades but require parallel development of HR capabilities, governance structures, and a change-oriented organizational culture.

This study proposes an Integrative and Adaptive HR Management Model to support e-government, comprising five interconnected components. First, ASN Digital Competence is critical for equipping civil servants with the skills needed to operate e-government platforms effectively, implemented through national certification and role-based training aligned with actual job demands. Second, Adaptive Organizational Structure involves restructuring to establish dedicated digital HR units and technology-focused functions, enhancing agility in system management. Third, Governance & Regulation provides a clear legal and operational framework, including interoperability standards and robust personal data protection mechanisms. Fourth, Infrastructure & Technology ensures the availability of reliable connectivity, server capacity, and integrated dashboards to support seamless service delivery. Finally, Digital Organizational Culture fosters openness to innovation, reinforced by communication strategies, incentive systems, and leadership role models that encourage adoption and sustain behavioral change.

From a theoretical standpoint, this model integrates elements of the Technology Acceptance Model, DeLone and McLean's (2004) Information Systems Success Model, and Kotter's Change Framework, positioning HR not merely as a user of technology but as a strategic driver of transformation. The model recognizes HR's triple role as an enabler (improving efficiency through automation), integrator (unifying disparate data systems), and catalyst (promoting cultural change). Without these roles being strategically managed, the benefits of e-government risk being superficial and short-lived.

Comparative analysis with best practices in Estonia, South Korea, and Singapore illustrates how advanced digital governments place HR management at the core of transformation. Estonia's competency-based recruitment and interoperable X-Road platform, South Korea's continuous digital competency evaluation, and Singapore's focus on digital leadership development highlight the value of sustained investment in HR as both a technical and cultural resource. Although Indonesia has made progress, as reflected in its 77th place in the 2022 UN E-Government Development Index, persistent gaps in HR capability and system fragmentation remain significant obstacles.

The implication of these findings is that strengthening HR management for e-government is not a peripheral task but a central pillar of bureaucratic reform. This requires aligning competency development with system design, institutionalizing change management practices, and ensuring policy coherence between central and local levels. By adopting the proposed model, Indonesian public institutions can move toward a more integrated, secure, and citizen-oriented digital bureaucracy, increasing both efficiency and public trust in government services.

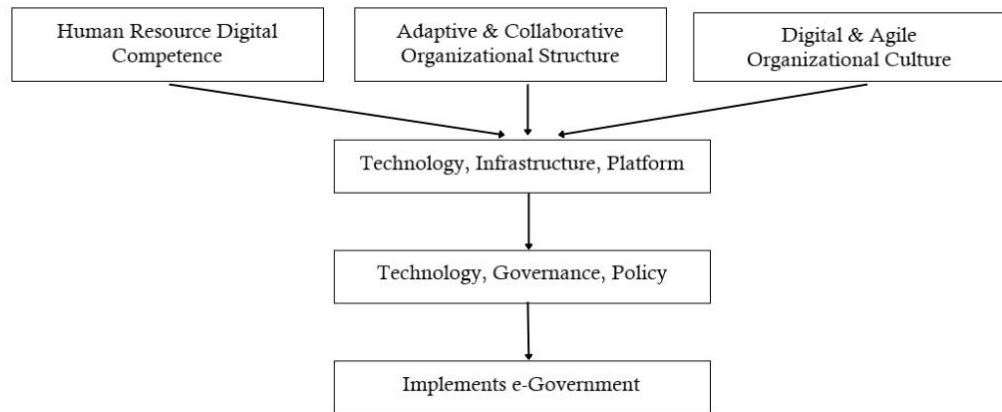


Figure 1. Visualization of the E-Government Supporting HR Management Model

Figure 1 shows the e-government implementation framework, which begins with three key elements: HR digital competency, an adaptive and collaborative organizational structure, and a digital and agile organizational culture, which collectively form digital technology, infrastructure, and platforms. This layer is further strengthened by regulations, governance, and policies, enabling a digital government ecosystem to be realized. With this flow chain, e-government implementation will only be successful if competent human resources, a supportive structure and culture, appropriate technology, and adequate regulations are integrated and synergistic.

Characteristics of the Model: 1) Can be applied at the central and regional levels; 2) Integrative, namely combining human resources, systems, and regulations; 3) Adaptive, flexible to the regional context and capacity; and Results-oriented, focused on efficiency, transparency, and public satisfaction. The theoretical implications of this model broaden the understanding of how digital HR management theory, policy implementation, and information system success can be operationalized simultaneously in the context of developing countries. Its practical implications can provide direct guidance for institutions such as the National Civil Service Agency (BKN), the Ministry of Administrative and Bureaucratic Reform (PAN-RB), and the Ministry of Immigration and Corrections in developing a roadmap for HR-based digital transformation.

CONCLUSION

This study reveals that human resource management (HRM) plays a pivotal role in advancing e-government implementation in Indonesia's public sector. The main challenges identified include uneven digital literacy, resistance to change, inadequate infrastructure, and fragmented regulatory frameworks. These issues hinder the optimal use of digital HRM systems and limit the integration of technology into civil service management. The study contributes to the literature by emphasizing the importance of aligning HRM strategies with e-government objectives, proposing a model that integrates contextual training, non-material incentives, and regulatory reforms to improve system adoption and efficiency. Based on these findings, several policy recommendations are proposed: developing segmented and context-specific digital training programs; enhancing interoperability among HRM systems; allocating dedicated funding for digital transformation at regional levels; and revising civil service regulations to better accommodate technological advancements. Despite these contributions, this study has limitations. It does not employ a qualitative approach or multi-level case studies, which could provide deeper contextual insights. Furthermore, its scope does not include longitudinal analysis to track the long-term effects of digital interventions. Future research should incorporate mixed-method approaches, comparative analysis with other developing countries, and exploration of artificial intelligence (AI) and automation in public HRM. These steps would enable more adaptive, evidence-based policies to strengthen digital competency and resilience in the public sector.

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