

Research Article

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The Role of Human Resource Education in Strengthening Public Service Transformation: A Case Study of the North Nias District Government

Amosi Waruwu^{ID}, Humaizi^{ID}, Dewi Kurniawati^{ID}, Tunggul Sihombing^{ID}

Abstract

Background/purpose. The main problem addressed in this study is the challenge of enhancing public service efficiency and transparency in North Nias Regency, an area with significant geographical and infrastructural limitations. This research was conducted to investigate how human resource education can facilitate the transformation of public services through the adoption of e-office systems, especially critical during crisis situations like pandemics, ensuring effective and sustainable digital technology implementation.

Materials/methods. A qualitative research methodology was utilized, incorporating in-depth interviews, participatory observation, and document analysis as the main data collection techniques to explore the impact of human resource training on the adoption and effectiveness of e-office technology.

Results. The study's findings reveal that continuous human resource education significantly enhances the acceptance and efficiency of e-office technology, leading to improved operational efficiency, administrative transparency, and increased public participation.

Conclusion. The study concludes that integrating human resource education throughout all phases of technology implementation is crucial for overcoming adoption barriers and bolstering local capacity. It recommends sustained investments in technology infrastructure and human resource training programs and emphasizes the importance of periodically evaluating and adjusting the e-office system to adapt effectively to the changing needs and challenges of the public and the local environment.

1. Introduction

In the era of rapid globalization and technological advancement, governments worldwide, including North Nias, strive to enhance the efficiency and effectiveness of their public services. This district, located in the province of North Sumatra, Indonesia, characterized by its archipelagic geography and inadequate infrastructure, frequently faces challenges in delivering quick and accurate public services (Maji et al., 2024; Vrabie, 2023).

Human resource education and training have become key elements in addressing these challenges. Efforts to enhance qualifications and skills in the public sector are essential to supporting the implementation of efficient information technologies, such as the e-office system. This system, which utilizes information technology to minimize paper use and speed up administrative processes, is one of the transformation strategies expected to improve the government's operational efficiency (Lekkas & Souitaris, 2023; Pariso & Marino, 2020).

Moreover, experiences from the COVID-19 pandemic have demonstrated the importance of having governmental systems that can operate effectively amid crises. Digitalization is key to continuing to serve the community without being hindered by physical restrictions, making the education of human resources about digital technology increasingly critical (Guzik, 2023; Moser-Plautz & Schmidhuber, 2023).

However, sustainable and effective digital transformation in the long term requires an adaptive and responsive educational foundation. According to the OECD Digital Government Index (DGI) 2023, the success of digital transformation in the public sector depends on the availability of educated and trained human resources capable of managing and utilizing emerging technologies such as artificial intelligence. This underscores the importance of integrating human resource education into the digital transformation plans of governments (OECD, 2024).

In North Nias Regency, efforts to transform public services through the implementation of the e-office system have begun as part of an initiative to enhance the efficiency and transparency of government administration. However, one of the main challenges faced is the adequacy of human resource education and training. Many government employees and members of the community do not fully understand or have the skills to utilize digital technology effectively. These limitations relate not only to technical ability but also include adaptation to the workflow changes demanded by the e-office system. The geographic factors and limited infrastructure in some areas of North Nias also contribute to difficulties in providing uniform and comprehensive training, making human resource education crucial to ensure that all community members, not limited to government employees, have access and the ability to interact with digital services. Education and training specifically structured, considering the uniqueness of the local conditions, are necessary to overcome these barriers, thereby enabling broader and deeper technology implementation across all layers of society and government.

In the context of North Nias Regency, investment in human resource education and training is expected to reduce bureaucracy and enhance the responsiveness and reliability of public services. Through continuing education initiatives, public sector human resources are prepared to expedite administrative processes and enhance service transparency, ensuring broader and more effective acceptance of digitalization (Herman et al., 2022; Matheus et al., 2023). Further, the transition from conventional systems to digital-based systems requires changes in thinking paradigms and work culture. Consistent and ongoing education will enable employees and government officials to adopt and utilize new technologies more effectively, simultaneously reducing internal resistance that may arise and strengthening the implementation of the e-office system (Erkut, 2020).

Human resource education also becomes a crucial component to ensure that digital transformation does not leave behind segments of the population that are not integrated with digital

infrastructure. Policies formulated need to consider the specific needs of public services and the diversity of technology access among citizens so that each individual receives equal access to enhanced services (Rukanova et al., 2023; Dalimunthe et al., 2024). Given the urgency to improve the efficiency and effectiveness of public services in isolated areas like North Nias, human resource education plays a key role. This education not only strengthens the resilience of local government systems in facing emergencies such as pandemics or natural disasters but also ensures that the government can continue to meet public needs with minimal obstacles (Bawole & Langnel, 2023; Skierka, 2023). An e-office implementation supported by educated and trained human resources promises a more efficient, transparent, and inclusive transformation of public services, making North Nias a model for other areas in Indonesia in adopting technology for better public services.

Previous studies have explored various aspects of digital transformation in public sector services with diverse approaches. Kitsios, Kamariotou, and Mavromatis (2023) focus on the driving factors and outcomes of digital transformation, highlighting elements that facilitate or hinder the digitization process in the public sector. Meanwhile, from a German perspective, Kuhlmann and Heuberger (2023) delve into the implementation and impact of digital transformation at the local level, showing the challenges local governments face in adapting new technologies. Taufik (2023) evaluates the implementation of integrated digital public services in Makassar City, identifying the effectiveness and obstacles in using government apps to enhance community services.

Unlike these studies, the proposed research in North Nias Regency emphasizes the importance of human resource education in strengthening the transformation of public services through digital technology. This study integrates the educational dimension to address geographic and infrastructure challenges that have not been extensively researched before. By focusing on training and human resource education as key factors for the success of digital initiatives, this research offers a new perspective on the digital transformation of the public sector, especially in archipelagic regions like North Nias, opening up new and urgent research gaps in the existing discourse.

This research specifically addresses two primary questions: (1) How is the implementation of the e-office system transforming public service delivery within the North Nias Regency Government? and (2) How effective and efficient is human resource education in supporting the digital transformation of public services in the North Nias Regency Government?

The urgency of this research emerges from the pressing need to overcome geographical constraints and infrastructure limitations that often hinder the delivery of public services in North Nias Regency. With the increasing need for efficient and responsive public services, especially in crisis situations like pandemics, effective human resource education becomes critical to ensure that digital technology, particularly the e-office, can be implemented and utilized optimally. This education will not only assist in reducing bureaucracy and enhancing transparency but will also strengthen local government's capacity and resilience in facing future challenges. Therefore, this research aims to explore how structured and continuous education and training can bring significant changes in government operations, enabling a more inclusive and sustainable transformation of public services in island areas with unique challenges like North Nias.

2. Literature Review

In this literature review section, the research examines various literatures related to the role of human resource education in strengthening the transformation of public services. Specifically, this study focuses on the implementation of digital technology in public services in North Nias Regency, emphasizing the importance of building human resource capacity and competence as a fundamental basis for successful digital transformation. This review will explore various theories and models that support the integration of human resource education into public service transformation strategies and compare findings from previous research conducted in various regions and similar contexts.

Before conducting a critical analysis, the author collected 1,000 previous studies using the Publish or Perish application, which were then analyzed using network and density analysis through the Vosviewer software, with the results as follows:

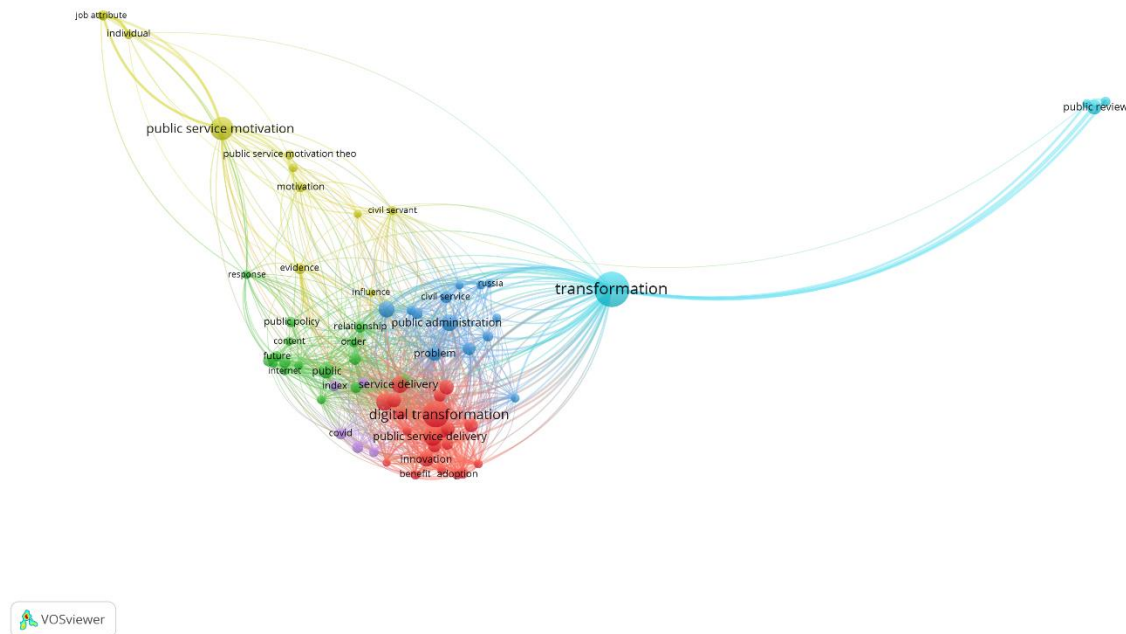


Figure 1. Network Analysis of Previous Research (Source: Vosviewer, 2024)

The network analysis displayed in this visualization illustrates the thematic relationships between various concepts related to digital transformation in public services. From this visualization, we can identify several main thematic groups that are interconnected and influence each other. First, there is a group focused on "public service motivation," closely related to motivation theory in public services, highlighting the importance of factors such as individual motivation and job attributes in driving the adoption and implementation of digital transformation. This group is closely related to the themes of "public administration" and "civil service," which emphasize the administrative structure and the role of civil servants in the implementation of new technologies.

The second dominant group is "digital transformation," directly related to "service delivery" and "innovation." This indicates that digital transformation in public services is often triggered by the need to improve service delivery and adopt technological innovations. The relationships between groups indicate a dynamic interaction between digital policies, technology adoption processes, and public service outcomes. Emphasis on "public service delivery" in the context of the COVID-19 pandemic, for example, shows the urgency of digital transformation as a response to global challenges. Additionally, connections to "benefit adoption" and "problem" highlight how technological solutions are targeted to address specific problems in public services, while noting the benefits gained from implementing effective digital systems.

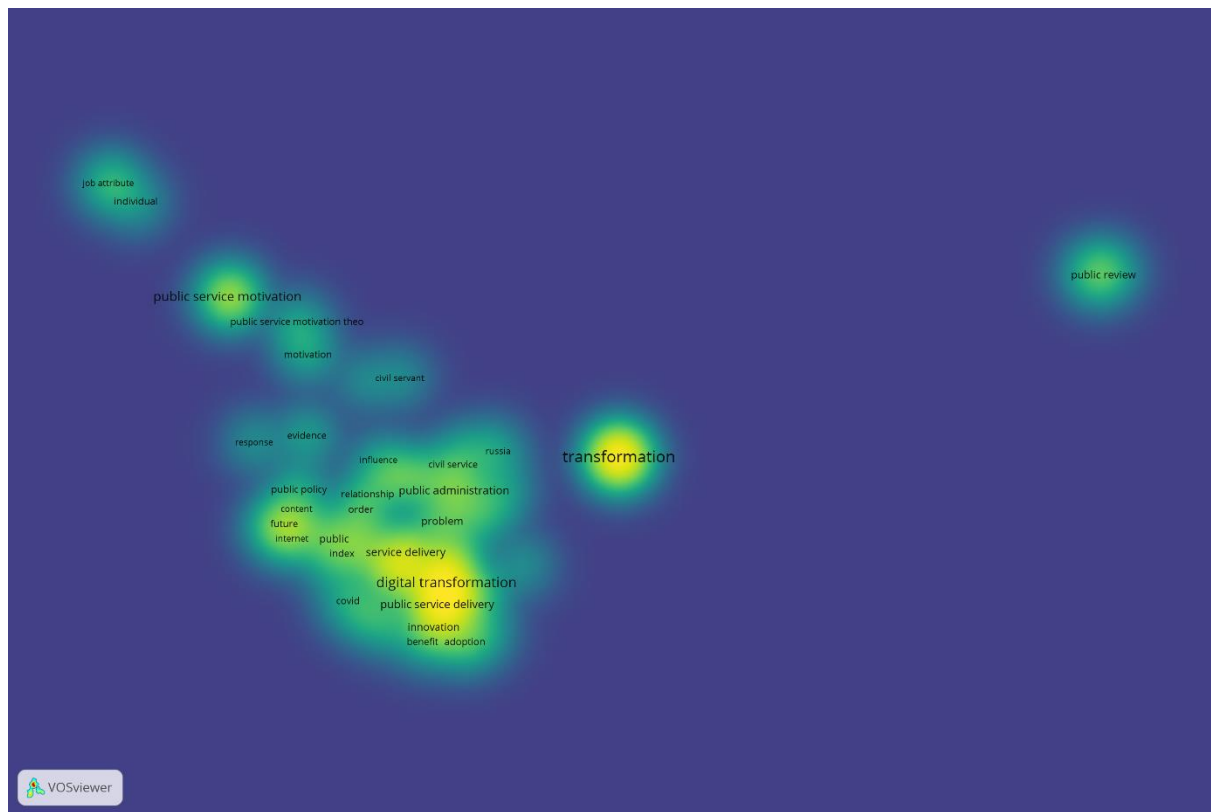


Figure 2. Density Analysis of Previous Research (Source: Vosviewer, 2024)

The density analysis in this visualization depicts the distribution and concentration of topics related to digital public service transformation. A significant density center is found in the areas of "transformation" and "digital transformation," indicating that the majority of previous research has focused on technological aspects and their implementation in public services. This area highlights how digital innovations are integrated into public service operations to enhance efficiency and transparency. Topics such as "public service delivery" and "benefit adoption" are closely related to how new technologies are applied to improve the quality of services provided to the community, and also how the benefits of adopting these technologies can be practically realized in the context of public services.

While the main focus on the density of previous research lies in technology aspects and their applications, there is a gap in research that specifically looks at human resource education as a crucial factor in supporting public service transformation. This research identifies that gap and focuses on the importance of human resource education and training to optimize the application of technology in public services (Ritonga et al., 2025). Thus, this research not only complements previous explorations related to infrastructure and technology but also expands the understanding of how human resources can be prepared to support sustainable and inclusive digital transformation. This is particularly important in contexts like North Nias Regency, where geographical and infrastructural challenges add complexity to the digitalization of public service processes.

The thematic clusters identified in the VOSviewer analysis align closely with existing theoretical frameworks and empirical findings discussed in prior literature. Specifically, the emphasis on 'public service motivation' is consistent with established concepts highlighting intrinsic factors that drive public employees' adoption of innovations. Meanwhile, the connection between 'digital transformation' and 'service delivery' resonates with broader arguments regarding digital-era governance and the critical role of technological innovations in enhancing governmental efficiency. Furthermore, the identified focus on benefit adoption and problem-solving through technology reflects recent insights, suggesting that successful digital transformation relies heavily on institutional

readiness, employee competence, and strategic capacity-building—thus underscoring the essential role of human resource education explored within this study. In addition to the above analyses, the author selected several previous studies for critical comparison, including:

Chen et al. (2023) conducted a study using a quantitative research methodology to test the implementation of the Internet of Things (IoT) in enhancing e-government public services. Their findings suggest that the use of IoT significantly increases the efficiency and accuracy of e-government services, reducing waiting times and enhancing user satisfaction. Unlike this research, the study by Chen et al. focuses on a specific technology aspect (IoT), while this research examines the influence of human resource education in supporting the adoption of general technology for public service transformation.

Dewi and Suardana (2023) used a qualitative approach to explore the implementation of agile governance in digital-era public services, interviewing various stakeholders to gain deep insights into changes in public administration practices. They found that the implementation of agile governance facilitates rapid adaptation to changing public needs and expectations and enhances collaboration between departments. Unlike this research, which emphasizes education and training as the main enabler of digital transformation, Dewi and Suardana focus on administrative flexibility and response speed in governance.

Lima, de Sousa, and Cristóvam (2023) examined the influence of government platforms on public services under Law 14,129/2021 in Brazil through document analysis and policy review. Their study shows that government platforms can improve the accessibility and integration of public services but highlight the need for strategic thinking in technology implementation. This research, which also examines digitalization, distinguishes itself by focusing on the influence of HR education, not just on technology implementation or regulation as the main focus.

Orazgaliyeva et al. (2023) explored the use of e-government as a tool to enhance the efficiency of public administration in Kazakhstan using a case study with a descriptive-analytical approach. They found that e-government strengthens transparency and accountability but faces barriers in data integration and user acceptance. This research differs in that its focus is not just on the efficiency and effectiveness of technology but also on how HR education can facilitate the transition to such technologies.

Wamba et al. (2024) analyzed how new technologies, particularly blockchain, can resolve critical issues in public sector organizational operations. Using a multiple case study approach, they identified that blockchain-based projects provide significant improvements in security, transparency, and efficiency. This research concludes that technology plays a key role in the transformation of the public sector, an area also explored in this research, but with the added focus on how HR education enables the adoption and adaptation of such technologies.

3. Methodology

In this study, a qualitative method is employed to delve into the role of human resource education in the implementation of the e-office system in North Nias Regency. This approach is crucial for understanding how training and education influence the acceptance and effectiveness of technology in public services, showcasing the dynamics between social interaction, technology, and the user experiences of the involved system participants (Creswell & Creswell, 2022; Weyant, 2022). This research adopts a descriptive-analytical approach based on the framework developed by Miles and Huberman, which enables the formation of a deep understanding of how HR education affects the adoption and effectiveness of e-office in enhancing public service efficiency (Strunk & Mwavita, 2021).

Data is collected through a combination of primary and secondary sources. Primary data is obtained through in-depth interviews with government employees and related stakeholders who have received specific training on the operation and management of the e-office, using purposive sampling techniques to select respondents who have directly experienced changes due to the implementation of the e-office as shown in table below:

Table 1. Research Informant

No	Name	Position/Function	Gender	Educational Background	Informant Type
1	Efori Zega	Head of ULP Section (LPSE Application)	Male	Bachelor of Applied Science	Primary Informant
2	Yohanes Lase	Head of Revenue Division (ISTS Bank Sumut)	Male	Bachelor of Computer Science	Primary Informant
3	Suparman Zega	Head of BKSDM Division (e-Kinerja App.)	Male	Bachelor of Law	Primary Informant
4	Raradodo Waruwu	Head of KOMINFO Department (Website)	Male	Bachelor of Law	Primary Informant
5	Wa'ozisokhi Zega	Head of Elementary Education Division (ARKAS Application)	Male	Master of Government Science	Primary Informant
6	Yulianus Zalukhu	Head of Accounting Section (SIPD-RI)	Male	Master of Management	Primary Informant
7	Astuti Hia	Restaurant Owner (Community)	Female	High School Graduate	Triangulation Informant
8	Firman Zebua	Photocopy Shop Owner (Community)	Male	High School Graduate	Triangulation Informant

The research questions employed for data collection were carefully developed based on theoretical insights from human resource education and training literature, particularly emphasizing the importance of structured capacity building and digital literacy programs for successful public sector transformations. The questions were specifically informed by Adult Learning Theory, highlighting the need for targeted and practical training approaches that align closely with employees' professional roles and everyday operational challenges. Moreover, demographic characteristics, such as educational backgrounds and occupational responsibilities of participants (as detailed in Table 1), guided the formulation of questions to ensure relevance and depth in exploring the effectiveness and efficiency of HR training initiatives within the North Nias Regency Government context.

Secondary data includes official documents such as activity reports and government policies relevant to the implementation and education of the e-office, providing additional context for analysis. Participatory observation and document analysis are used to directly observe the use of the e-office system and its interactions with users in the field and verify data obtained from interviews and secondary sources.

The data analysis process follows the interactive model proposed by Miles, Huberman, and Saldana, involving stages of data reduction, data display, and conclusion drawing. Data from

interviews and observations are organized to identify main themes, which are then presented in an analytical narrative. Triangulation techniques are applied to ensure the validity and reliability of findings, integrating various sources and methods to produce an accurate and representative interpretation of the impact of human resource education on the use and effectiveness of e-office in enhancing public services in North Nias Regency (Flick, 2022).

4. Results

4.1. The Implementation of E-office as Public Service Transformation in the North Nias Regency Government

The implementation of the e-office system in the North Nias Regency government marks a significant step in transforming public services and enhancing efficiency, transparency, and responsiveness. This initiative involves upgrading ICT infrastructure, such as internet bandwidth and supporting devices (Deng et al., 2024), along with the integration of services to speed up decision-making processes. This transformation also necessitates employee training and the development of cybersecurity policies to mitigate risks associated with digital data processing (Schäfer, 2023; van Assen, 2021). The success of the implementation relies on employees' and the community's adaptation to new technology, necessitating effective change management and continuous evaluation to ensure the system remains relevant (Enang et al., 2022). From interviews with various stakeholders, the author obtained data as follows:

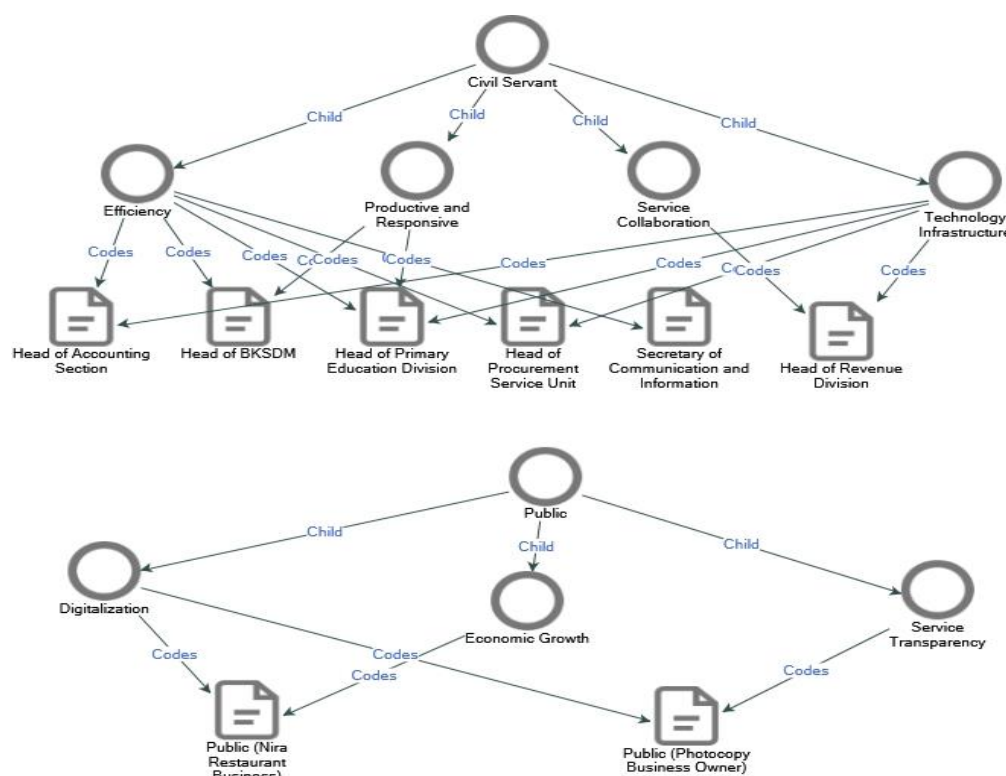


Figure 3. Interview Map Regarding Organizational Communication (Source: NVivo 15, 2024)

The analysis of data from in-depth interviews with stakeholders in North Nias Regency reveals the critical role of human resource education in supporting the effectiveness of e-office implementation. This transformation requires not just the use of advanced technology but also comprehensive training and continuing education to ensure all government employees can efficiently operate the system and understand the relevant security protocols (Hasal et al., 2021; Kitole et al., 2024; Naamati-Schneider, 2023).

Education and training targeted at human resources should cover technical aspects of using the e-office as well as the development of soft skills such as change management and data security. As highlighted by the Head of Accounting and the Head of Human Resources Development, enhancing these capacities will not only improve operational efficiency but also the productivity and responsiveness of employees to public needs. Furthermore, this approach must be inclusive, integrating employees from various divisions and levels to reduce the digital divide within the government and ensure transparency and accountability are maintained across all sectors (Vassilakopoulou & Hustad, 2023; Purba et al., 2024).

By combining HR-focused education on technology and change management, North Nias Regency can maximize the benefits of implementing e-office. This will not only strengthen the capacity of the local government to face future challenges but also enhance public trust through more efficient and transparent services. This research differs from other studies in that it focuses not only on technological aspects but also on how HR education can be integrated to support the effective and sustainable adoption of such technology.



Figure 4. Word Cloud from Interview Analysis (Source: NVivo 15, 2024)

A word cloud generated from the NVivo analysis illustrates key elements playing roles in the public service transformation through the implementation of the e-office system in the North Nias Regency Government. Words like "services," "system," "efficiency," "integration," and "management" stand out, highlighting a focus on enhancing service efficiency and integration through digitalization. This underscores the importance of an integrated system to expedite government processes, reduce time and bureaucracy, and improve overall resource management.

However, digital transformation through e-office involves more than just the application of technology; it also includes the crucial aspect of adequate human resource education and training to ensure successful and effective implementation. The words "training" and "digital" in the word cloud highlight the urgent need for effective and ongoing training. Such training is vital not only for minimizing operational errors but also for optimizing the benefits of the existing digital infrastructure. Extensive education and socialization processes are necessary to ensure that both government staff and citizens understand how to use the new system and the benefits it brings.

Aspects like "socialization" and "public access" are also critical in the word cloud, indicating the importance of ensuring public acceptance of the e-office. The community must be involved through extensive education and socialization initiatives to support a smoother transition to more digital and online-accessible services. This not only strengthens the acceptance of new technology by the community but also aids in building trust in the government changes.

Furthermore, words like "satisfaction" and "online" depict the shift to more efficient and environmentally friendly operations, signifying the transition to an almost entirely paperless work environment. Reducing paper usage not only saves costs but also supports environmental conservation efforts. The digitalization of documents speeds up information retrieval and enhances user satisfaction, which is a key indicator in evaluating the success of new technology implementation.

This analysis shows that while the e-office offers numerous operational advantages, its full success heavily depends on the quality of human resource education and training. Education aimed at enhancing digital skills and change management capabilities is key to ensuring that technological innovations are adopted effectively and sustainably in North Nias Regency. This reaffirms that any digital transformation effort must be accompanied by a strong educational strategy to develop the internal capacity that will manage and maintain the new system.

4.2. Effectiveness and Efficiency of Human Resource Education in North Nias Regency Government in Public Service Transformation

In North Nias Regency, the local government has identified the need to implement a series of educational training programs specifically designed to enhance human resource capabilities. These programs aim to address obstacles in technology adoption, such as steep learning curves and concerns related to data security, as well as to maximize employee efficiency and productivity. With a focus on digital literacy, change management, cybersecurity, operational efficiency, and system integration, each program is developed to address the critical aspects of e-office implementation. The following details the training programs that have been designed, each with specific objectives to support the success of digital transformation in the North Nias Regency government.

Table 2. Human Resource Education Program in North Nias District Government

No.	Program	Description
1	Basic Information Technology Training	This program is designed to overcome the steep learning curve associated with new technology usage. Its aim is to enhance employees' digital literacy, providing them with fundamental skills in operating relevant software and hardware, as well as understanding basic principles of data security.
2	Change Management Workshop	Considering that resistance to change is a major barrier, this program focuses on equipping employees with skills to manage change. The workshop aims to prepare employees to accept and adapt to new work processes introduced by the e-office system, and strategies to overcome psychological barriers to technology adoption.
3	Cybersecurity Course	Given the importance of maintaining data security within the e-office system, this course offers in-depth training on security protocols, data breach prevention, and how to handle cyber attacks. The goal of this course is to strengthen IT infrastructure security and

		ensure employees can identify and address potential security threats.
4	Operational Efficiency Seminar	This seminar aims to demonstrate the benefits of reducing operational costs through digitalization. Through this training, employees will learn how to enhance work efficiency using digital tools provided by the e-office system, including effective reporting and monitoring for data-driven decision-making.
5	System Integration Training Program	This program aims to address challenges in integrating different systems and services within the e-office. The training will equip employees with skills to utilize the e-office system's integration features, ensuring interoperability between departments, and maximizing the use of technology in government procedures.

In North Nias Regency, the government has launched a series of educational training programs aimed at enhancing human resource capacities to improve the effectiveness and efficiency of public services through digitalization. One such program is the Basic Information Technology Training, which focuses on reducing the steep learning curve for new employees in using technology. This program not only teaches basic skills in software and hardware operations but also educates employees about fundamental data security principles, aiming to enhance their digital literacy.

Furthermore, the Change Management Workshop is designed to address resistance to change, often a challenge in implementing new technologies. This workshop equips employees with the skills to manage change, preparing them to accept and adapt to new work processes introduced by the e-office system. The program also provides strategies to overcome psychological barriers that can hinder technology adoption, ensuring that the transition to new practices is smoother and more widely accepted among staff.

The Cybersecurity Course is another critical program, responding to the urgent need to secure data within the e-office system. This training covers in-depth aspects of security protocols, data breach prevention, and techniques to handle cyber attacks. The course aims to strengthen IT infrastructure and ensure that all employees can identify and address potential security threats, thus safeguarding the integrity of data and government systems from external risks.

The Operational Efficiency Seminar and the System Integration Training Program are designed to maximize the benefits of e-office implementation. The operational efficiency seminar demonstrates how digitalization can reduce operational costs and enhance service efficiency, while the system integration training focuses on the effective use of the e-office system's integration features. These programs not only enhance employees' abilities to manage and use technology but also ensure that various systems and services can operate harmoniously under a unified platform, enhancing the government's ability to respond effectively to citizens' needs (Humaizi et al., 2024).

Human resource education emerges in the context of steep learning curves for employees and other issues with adopting new technology (Leuchtmann et al., 2023; Metelkov, 2020). The North Nias Regency government faces the need for effective training and stringent security protocols (Tan, 2023). Although the initial investment in technology and infrastructure may seem significant, the long-term benefits, such as reduced operational costs and enhanced service efficiency, provide a strong justification for this expenditure, supporting further innovation and integration of the e-office system into everyday community life (Baldwin et al., 2023). From interview results with stakeholders, the author has accumulated data on the effectiveness and efficiency of human resource education as follows:

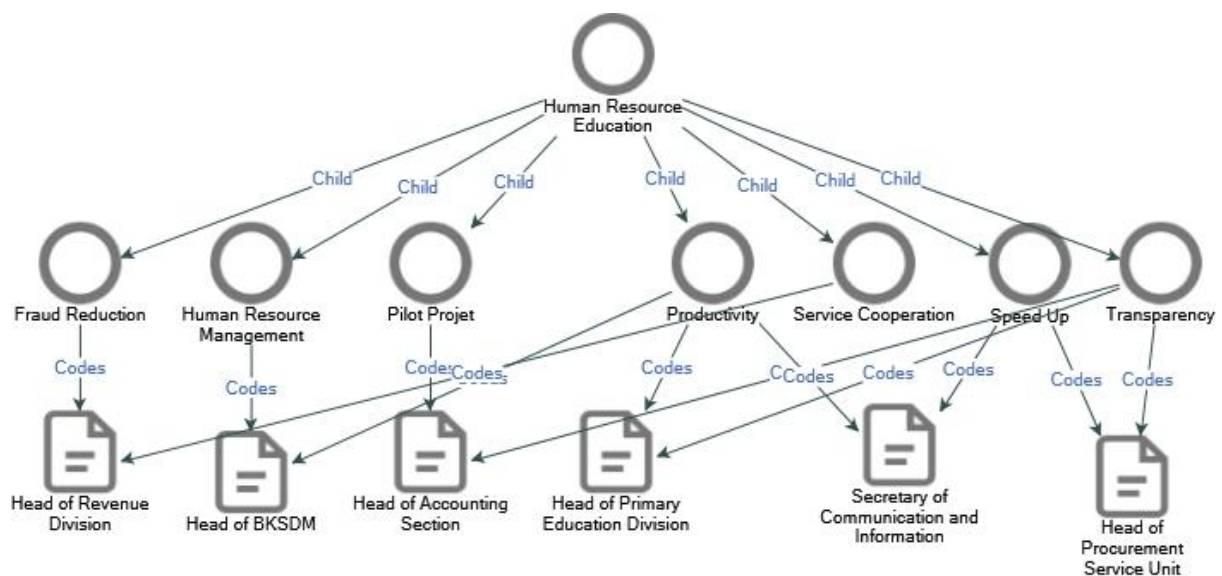


Figure 5. Interview Map Regarding Effectivity and Efficiency in Human Resource Education

In efforts to enhance the efficiency and effectiveness of government administration, North Nias Regency has implemented the e-office system, which has proven to accelerate administrative procedures, reduce fraud, and enhance interdepartmental cooperation. The implementation of this technology, as evidenced by data collected through NVivo interviews, shows significant improvements in process speed and financial integrity, particularly in the Revenue Division. However, the mere implementation of technology is insufficient. The inclusion of human resource education is key to ensuring that the full benefits of the e-office can be realized.

Human resource education and training programs must be conducted continuously to develop employees' abilities to use the e-office system effectively. Efficient HR management through this system includes attendance settings, performance assessments, and training that can be well integrated into the digital system, allowing for more accurate resource allocation and improved employee competence. This approach also supports the execution of vital pilot projects to identify and refine operational aspects before full implementation, ensuring successful adaptation to local realities.

Furthermore, the e-office assists in improving productivity and speeding up the dissemination of information, enabling the government to act more swiftly in situations requiring immediate response. This integration not only speeds up services but also enhances transparency and efficiency in the procurement of goods and services, as highlighted by the Head of the Procurement Unit. With the e-office system, the procurement process becomes more transparent, reducing redundancy, and significantly speeding up significant processes, supporting a cleaner and more accountable government policy (Jabbari et al., 2022; Kurniawati et al., 2024).

Human resource education in the context of the e-office not only focuses on enhancing technical skills but also must include aspects of soft skill development, such as adapting to change, stress management, and effective communication (Mata et al., 2023). This is crucial to ensure that all employees are not only ready to use new technology but also capable of contributing to a changing work environment. Through comprehensive and ongoing education, North Nias Regency aims to bridge the digital divide and enhance public access to services, ensuring that digital transformation brings the government closer to its citizens.

To effectively integrate the e-office system in North Nias Regency, it is crucial to apply the diffusion of innovation theory developed by Everett Rogers. This theory emphasizes the importance of adopting innovation through five attributes: relative advantage, compatibility, complexity,

trialability, and observability. In the context of the e-office, effective training helps demonstrate relative advantage and reduce the complexity of using the new system, enabling employees to more easily adapt and accept the changes brought by digitalization.

On the other hand, the application of Malcolm Knowles' Adult Learning theory is also relevant in this context, as it states that adults learn most effectively when the material taught is relevant to their work or personal interests. In a government setting where the e-office is implemented, training must be designed considering the specific needs and work contexts of government employees, allowing them to see firsthand how new knowledge can be applied in their daily tasks. The integration of both theories in an educational and training strategy for HR can facilitate a smoother transition to new practices, maximizing the acceptance and effectiveness of the e-office system and ultimately leading to more efficient and responsive public services.

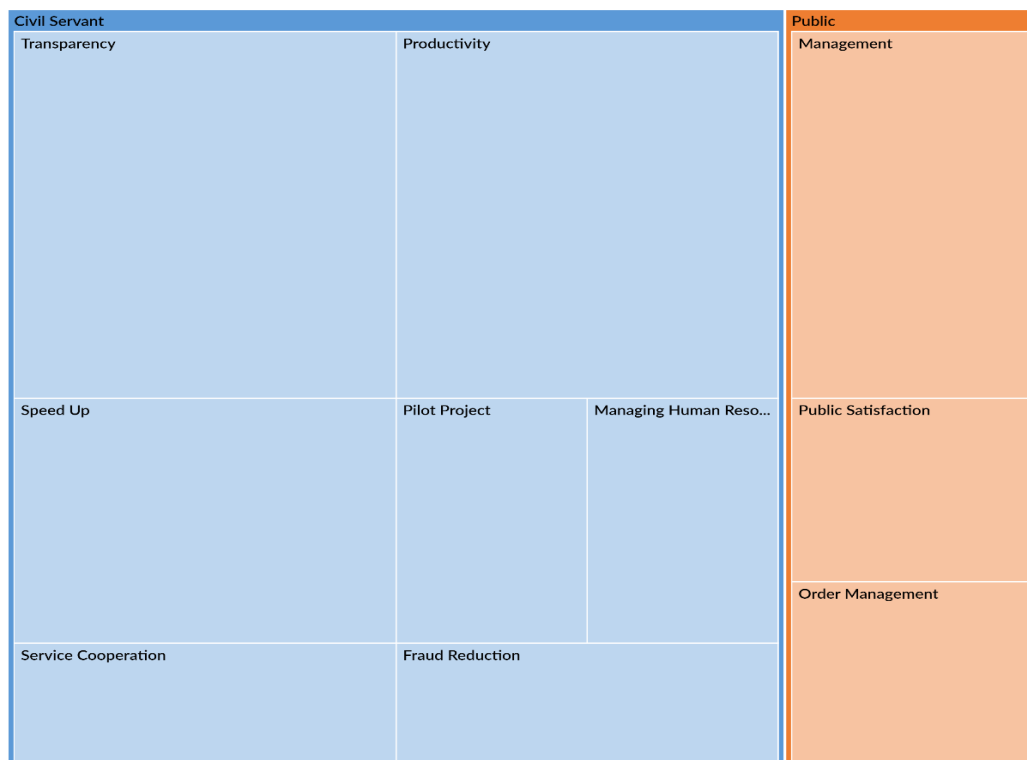


Figure 6. Hierarchy Chart Regarding Effectiveness and Efficiency in Bridging the Digital Divide

The implementation of the e-office system in North Nias Regency is focused on enhancing transparency, productivity, and inter-service collaboration, resulting in more effective and efficient government operations. The enhanced transparency provided by the e-office system allows every transaction and government process to be more easily tracked and monitored, strengthening public trust and facilitating more open dialogue between the government and the community. This is evident from the improved audit capabilities and reduced fraud, demonstrating how digitalization strengthens the integrity of financial and administrative processes (Khan et al., 2023).

The use of automation in the e-office enhances employee productivity by eliminating many time-consuming administrative tasks, freeing them to focus on tasks that require critical thinking. This benefit extends to human resource management, where the digitized system facilitates more effective employee management, from recruitment to career development, boosting morale and work motivation (Jadesola Ololade et al., 2023).

E-office pilot projects allow North Nias Regency to identify and tailor technology to meet specific needs, ensuring seamless integration with existing infrastructure. The reduction in service process time is especially crucial in emergency and social services, where service speed can significantly

impact public welfare, and better interdepartmental cooperation through the digital platform enables a more coordinated and integrated approach to multi-party projects.

The success of the e-office also depends on employees' readiness to adapt to changes and adopt new ways of working. Ongoing training and development are essential to ensure that employees have the skills and knowledge required to effectively utilize technology, a commitment described by Everett Rogers' diffusion of innovation theory, which emphasizes the importance of individual perceptions in the system about the benefits of technology for efficiency and job satisfaction (Park & Park, 2021).

In the long term, the e-office is expected to not only improve operational efficiency but also strengthen community engagement with the government. Constant evaluation and updating of the e-office system are key to ensuring that the technology remains relevant and effective in meeting future challenges, supporting a more inclusive and responsive digital governance to the needs of the citizens of North Nias Regency (Jiang et al., 2020).

In the context of implementing the e-office system in North Nias Regency, the diffusion of innovation theory proposed by Everett Rogers and Malcolm Knowles' Adult Learning theory both play crucial roles in facilitating the transition to new technology and strengthening community engagement. The diffusion of innovation theory emphasizes five important attributes—relative advantage, compatibility, complexity, trialability, and observability—which need to be considered to accelerate the adoption of innovation. In the case of the e-office, effective training helps reduce the complexity of technology, enhances the perception of relative advantage, and allows employees to 'try' the technology in controlled scenarios, thus increasing the likelihood of widespread adoption among employees.

Meanwhile, Adult Learning theory suggests that adults learn most effectively when education is tailored to their immediate needs and relevant to their professional lives. In implementing the e-office, this approach allows for training specifically designed to address the specific needs and concerns of employees, facilitating better understanding and faster integration of new technology into their work routines. This not only enhances efficiency but also strengthens engagement and job satisfaction, critical aspects identified by Rogers as having a direct influence on the success of innovation.

Integrating both theories creates a robust framework for education and training in a government setting that emphasizes the adoption of technology. By tailoring education to the needs and work context of government employees and recognizing the factors that influence technology acceptance, North Nias Regency can maximize the potential of the e-office system to deliver public services that are not only more efficient and transparent but also more inclusive and responsive to the needs of its citizens.

5. Discussion

The implementation of the e-office system in the North Nias Regency government has fundamentally changed organizational communication patterns and work dynamics, thanks to the deep integration of digital technology. As explained by Wang & Guo (2024), digitalization has become a crucial foundation for simplifying and accelerating administrative procedures, allowing information from top management to operational units to be delivered more quickly and in an organized manner. This process not only enhances operational efficiency but also strengthens interdepartmental cooperation, reduces fraud, and improves financial integrity.

However, the success of this transformation significantly depends on effective human resource education and training, which are essential elements to ensure the successful deployment of the e-office. Training in Human Resource Education is vital for developing employees' competencies in

managing and utilizing the new digital system. This approach, supported by Jean Piaget's Constructivism theory, assumes that the best learning occurs when individuals actively construct new knowledge and understanding through direct experience. In the context of the e-office, this means integrating training sessions that allow employees to interact with the system in real scenarios, reinforcing the effective use of the digital platform in their daily activities.

Moreover, as noted by Yuan et al. (2023) and Russmann et al. (2020), the e-office system facilitates both formal and informal communication. Formal communication through electronic reporting and automatic notifications is enhanced to ensure that all structured information is efficiently delivered. On the other hand, informal interactions among employees through digital platforms strengthen working relationships, promoting a more collaborative and supportive environment. This demonstrates how effective education and training can strengthen both aspects of communication, improving the overall work dynamics within the e-office environment.

Continual HR education develops competencies not only to prepare employees to face new technological challenges but also to ensure that they can adapt and innovate in their roles. This directly supports government efforts to bridge the digital divide and enhance public access to services, in line with increased trust and public participation in governance, as highlighted by Mata et al. (2023).

Overall, an integrated HR education approach in implementing the e-office in North Nias Regency is key to maximizing the system's effectiveness. It not only assists in change management and technological adaptation but also strengthens organizational communication and expands participation in data-driven decision-making, demonstrating how education focused on developing individual skills and capacities can revolutionize government operations.

This research introduces innovation in exploring public service transformation through human resource education in North Nias Regency, focusing on the implementation of the e-office system as a tool for enhancing administrative efficiency and transparency. Unlike previous studies that tend to focus on the technological aspects of digitalization, this study delves into the impact of HR education and training as fundamental factors supporting the success of technology in the public sector. By integrating diffusion of innovation theory and constructivist education, this research provides comprehensive insights into how locally relevant and tailored education can facilitate more effective adaptation and application of technology, enabling the sustainability of digital transformation in environments with significant geographical and infrastructural challenges. This offers a new and profound perspective that merges technical and human approaches in the digitalization of public services, emphasizing that the success of technological transformation also depends on the human capacity to operate it.

6. Conclusion

The implementation of the e-office system in North Nias Regency has successfully brought significant improvements in efficiency, transparency, and the accessibility of public services. Through the digitalization of administrative processes, the local government has been able to accelerate decision-making and service delivery, reduce operational redundancies, and enhance responsiveness to community needs. This research also reveals that this digital transformation has strengthened communication dynamics and interactions within the public sector, promoting more inclusive and effective processes. These findings imply that targeted investments in human resource education are essential for sustainable digital governance and may serve as a model for similar geographically challenged regions. Furthermore, the success of this transformation is inseparable from the role of human resource education, which helps develop employee competencies in managing and utilizing new digital technologies, supporting adaptation and innovation in their tasks.

7. Suggestion

Based on the findings, it is recommended that the North Nias Regency Government sustain and expand human resource education initiatives, particularly focusing on continuous digital literacy and change management training to enhance the effective and efficient adoption of e-office systems. These actions must directly correspond to the identified needs for improved operational transparency and public service responsiveness. Additionally, acknowledging the limitations of this research, particularly the focus on a specific geographic area and limited sample size, further studies should explore broader contexts and larger participant groups to provide more generalized insights into digital transformation in public administration.

Declarations

Author Contributions. The development of the conceptual framework and research design was led by AW and HH, ensuring a solid foundation for the study. DK and TS collaboratively formulated the methodology and conducted an extensive review of relevant literature. AW played a key role in gathering policy documents and sourcing pertinent research materials. Meanwhile, HH was responsible for synthesizing the findings and performing an in-depth theoretical analysis. Each author actively participated in refining the manuscript, providing critical input, and giving final approval for its publication.

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Conflicts of Interest. The authors declare no conflict of interest.

Ethical Approval. I confirm that I have obtained all necessary permissions in compliance with applicable laws for the publication of any personal information or images of research participants or other individuals. Furthermore, I agree to provide EDUPIJ with copies of the consent forms or proof of such authorization upon request.

Data Availability Statement. The data supporting the findings of this study are openly available at the Open Journal System of EDUPIJ and can be accessed via the following DOI/link

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