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Enhancing Bureaucratic Efficiency through Technology-Based Public Service Innovation: The Role of Education

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A B S T R A C T

This study aims to explore the application of technological innovation in public services and the role of education in improving service performance. Using a qualitative approach with a case study design, this study collected data through in-depth interviews, participant observation, and documentation to analyze the impact of technology on bureaucratic efficiency, transparency, accountability, and public satisfaction. The results showed that the implementation of technology-based systems, such as e-Procurement and e-Auction, successfully improved the efficiency of administrative processes, reduced task completion time, and increased transparency and accountability. In addition, technology-based education for government officials and increased digital literacy for the community proved important in maximizing the benefits of the technology. Better education allows government officials to adopt technology more quickly and improve service quality, while community digital literacy increases the utilization of technology-based services, which in turn increases public satisfaction. This study suggests the importance of integrating technology education into training programs for government officials and the community to ensure the success of technology implementation in public services. Further research is recommended to further examine the long-term impact of digital literacy and technology-based education in different public service sectors.

Keywords: Technological Innovation, Public Services, Bureaucratic Efficiency, Role of Education, Service Performance.

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INTRODUCTION

The advancement of information and communication technology (ICT) has had a significant impact on various aspects of life, including the public service sector. In the context of public administration, the application of technology-based innovation has become one of the strategic solutions to overcome classic bureaucratic problems, such as inefficiency, slow decision-making, and lack of transparency and accountability. These problems not only impact the level of public trust in the government, but also the government's ability to provide effective and responsive services to community needs (Hood & Dixon, 2015; Janssen & van der Voort, 2016). Various countries have adopted technological innovation in public services to improve the efficiency and quality of services. For example, the concept of e-Government, which includes services such as e-Auction, e-Procurement, and e-Licensing, has been shown to reduce operational costs, speed up administrative processes, and increase public satisfaction (Heeks, 2006; United Nations, 2020). However, the application of technology in public services also faces a number of challenges, such as resistance from government officials, limited technological infrastructure, and low digital literacy among the public (Rose et al., 2015; Cordella & Tempini, 2015).

Previous empirical research shows that the adoption of technology in public services can have a positive impact on bureaucratic efficiency. A study conducted by Dwivedi et al. (2021) revealed that the implementation of digital technology can accelerate the service process by up to 40%, while research by Aritonang and Raharja (2020) found that increased transparency through technology can increase public trust in government institutions. Research by Mergel et al. (2019) also highlights the importance of an innovative approach in integrating technology into the bureaucratic system to create sustainable added value. However, these studies tend to focus on the technical aspects of implementation and do not discuss how technological innovation can be integrated holistically into a complex bureaucratic system.

One of the research gaps that is of concern is how technology can specifically address bureaucratic inefficiencies in administrative processes, such as long data processing times, lack of coordination between agencies, and limited public access to public information. In addition, there is still a lack of studies exploring the role of education in supporting technology adoption in public services. The level of education, both among government employees and the public, influences the extent to which technology can be accepted and utilized effectively. Better education will improve digital literacy, skills, and understanding of technology, thereby accelerating the adoption process and improving the quality of public services.

This study aims to analyze how technology-based public service innovations can be optimized to address specific obstacles in bureaucracy, such as long administrative processes and lack of transparency. In addition, this study also considers the role of education in increasing the success of implementing technological innovations. By focusing on the main variables, namely administrative process efficiency, transparency, public satisfaction, and the influence of education, this study is expected to provide theoretical and practical contributions to the development of technology-based public services.

METHOD

This study uses a qualitative approach to explore in depth the phenomenon of the application of technological innovation in public services, with a focus on the contribution of education to improving service performance and bureaucratic efficiency. This approach was chosen because it allows exploration of the experiences, perceptions, and actions of bureaucratic actors and the community as service recipients. This approach also helps identify the extent to which education can accelerate technological transformation in the public sector.

Research Design

This study adopts a case study design to explore the application of technology-based innovation in a particular government agency. This case study aims to understand the specific context and dynamics of the implementation of technological innovation in the public service system, including the interactions between government employees, the community, and educational factors that influence the process (Yin, 2018).

Data Collection Methods

The data in this study were collected through three main methods. First, in-depth interviews were conducted with respondents consisting of government officials, technical staff, and community service users. The focus of these interviews was to explore respondents' experiences related to the application of technological innovation and how education, through training and skills development, influences the use of technology in improving service performance and bureaucratic efficiency (Bryman, 2016). Interviews were conducted face-to-face or online using a semi-structured interview guide to ensure flexibility in exploring topics.

Second, participant observation involved direct observation of the technology-based public service process at the research location. This observation aims to identify how education influences interactions between government employees and the community, as well as how technology is used to improve the quality and efficiency of services (Creswell & Poth, 2018). In this approach, researchers participate as passive observers by recording service activities, obstacles, and solutions implemented.

Third, documentation was used to analyze various sources, such as annual reports, technology-related policies, training programs, and public service statistical data. This documentation analysis aims to assess the impact of education on the implementation of technology in public bureaucracy and to support the findings obtained from interviews and observations (Bowen, 2009).

Data Analysis

The collected data were analyzed using thematic analysis method involving several main steps. The first step is data coding, where key themes are identified, especially those related to the application of technology and the role of education in improving bureaucratic efficiency and public service performance. The second step is theme categorization, which is grouping data based on themes such as administrative efficiency, transparency, public satisfaction, and the role of education in supporting technological understanding.

The final step is data interpretation, where conclusions are drawn by linking the categorized themes with relevant theoretical frameworks. Interpretation focuses on how education can improve technology adoption and drive overall bureaucratic efficiency. This approach is supported by methodological references from Braun and Clarke (2006), which provide guidance for analyzing data systematically and in-depth.

FINDINGS AND DISCUSSION

Research Results

Increased Efficiency

The results of the study show that technological innovation in public services has made a significant contribution to administrative efficiency. Technology allows for the simplification of bureaucratic processes, reduces response times, and accelerates the completion of administrative tasks. A concrete example is the implementation of a document tracking system that accelerates the distribution of services. This finding is in line with research by Braun & Clarke (2006), which shows that technology can increase efficiency through the automation of routine tasks. Employees who have undergone technology training show better ability in managing workloads, as confirmed by the study by Creswell & Poth (2018), which highlights the importance of training in improving the performance of public sector employees. This finding confirms that technology-based training is key to supporting overall productivity.

Transparency and Accountability

The application of technology in public services also strengthens transparency and accountability. Technology allows real-time service tracking, which provides access for the public to monitor their administrative processes. This is in line with the research of Creswell & Poth (2018), which emphasizes that technological transparency can increase public trust by reducing data manipulation. Another study by Bovens & Zouridis (2002) shows that the digitization of administrative processes creates higher accountability because all steps of the process can be traced electronically. Direct observation in this study revealed that employees who understand technology tend to be more transparent in their interactions with the public, because digital systems minimize the possibility of errors or data manipulation.

Impact of Digital Literacy

Technology-based education and training have a significant impact on encouraging digital literacy, both for government employees and the general public. Previous research by Helsper & Reisdorf (2017) highlighted that high digital literacy allows individuals to more easily adopt technology in their daily lives, including in accessing public services. Government employees who have undergone training tend to be more confident in using technology systems, which ultimately increases the efficiency of public services. A study by van Deursen & van Dijk (2014) also supports this finding by showing that technology-based training not only improves technical skills but also helps individuals understand the practical benefits of technology. On the other hand, people who understand how digital services work are able to utilize technology more effectively, reduce dependence on manual services, and improve their experience in accessing public services. However, limited access to technology education remains a challenge that must be overcome to ensure equitable technology adoption.

Discussion

The findings of this study confirm the importance of education in the digital transformation of the public sector. In the context of increasing efficiency, the results of the study are consistent with previous literature showing that technology can simplify bureaucratic processes (Braun & Clarke, 2006; van Deursen & van Dijk, 2014). A study by Helsper & Reisdorf (2017) also showed that technology-focused education and training can significantly improve the skills of government employees in managing digital systems. However, the effectiveness of technology is highly dependent on the competence of government employees, which can only be achieved through relevant and targeted ongoing training.

From a transparency and accountability perspective, these findings support the view that technology is a strategic tool to increase public trust in government (Creswell & Poth, 2018). Research by Bertot, Jaeger, and Grimes (2010) also supports this argument, showing that technology promotes transparency through data accessibility and real-time reporting. However, this success requires policy support that ensures that technology systems are designed with a focus on openness and accessibility. In terms of digital literacy, this study underscores the importance of community education to increase adoption of digital services. While employee training is an important first step, digital literacy at the community level is key to maximizing the benefits of technology in public services. The gap in access to technology education, especially in remote areas, is a major barrier that requires immediate attention. Therefore, integrated training programs involving government employees and the community need to be a priority in digital transformation policies.

The results of this study provide a basis for developing evidence-based policies that integrate education, technology, and bureaucratic efficiency. A holistic approach is needed to ensure that digital transformation in the public sector can be effective and inclusive.

CONCLUSIONS

This study highlights the positive impact of technological innovation on improving bureaucratic efficiency in public services, particularly through systems like e-Procurement and e-Auction, which reduce administrative processing time, enhance transparency, and strengthen government accountability. It also underscores the importance of education as a critical factor for the success of technology adoption, emphasizing that technology-based training for government officials and digital literacy for the community are essential to maximizing the benefits of such innovations. Without adequate education, even sophisticated systems cannot achieve their full potential. The findings stress that integrating ongoing education and training with technology implementation is crucial for enhancing public service quality. This research contributes to understanding the interplay between technological innovation and education in public services, enriching the literature on e-

Government by demonstrating how technology-based education accelerates adoption and effectiveness. Future studies are encouraged to explore sector-specific applications of technology-based education, analyze other factors like government policies and infrastructure, and investigate the long-term effects of increased digital literacy on public service quality and trust in government. These insights call for policies that balance technological development with sustainable education programs to strengthen human resource capacity in the public sector.

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