



PROFESSIONAL READINESS OF PUBLIC ADMINISTRATION STUDENTS FOR INTERNET OF THINGS-BASED PUBLIC SERVICE DIGITALIZATION: A CASE STUDY OF CAHAYA PRIMA UNIVERSITY

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ABSTRACT

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The acceleration of public service digitalization through Internet of Things (IoT) technology requires future public administrators to possess adequate professional readiness to adapt to emerging technological transformations. This study aims to explore the readiness of Public Administration students at Cahaya Prima University in responding to IoT-based public service digitalization in Bone Regency. A descriptive qualitative approach with a case study design was employed. Data were collected through semi-structured interviews, participant observation, and document analysis involving 12 students who had participated in internships and field practices related to digital public services. The findings reveal that students demonstrate initial readiness, particularly in technical competencies and positive attitudes toward technological innovation. However, significant limitations remain regarding data analysis, ethical awareness, and the ability to translate IoT-generated information into policy recommendations. The interaction among cognitive, affective, and psychomotor dimensions indicates that professional readiness is multidimensional and requires balanced development. The study highlights the importance of integrating IoT literacy, digital ethics, and experiential learning into public administration education. Such integration is essential for preparing adaptive, critical, and responsible future bureaucrats capable of supporting digital governance and smart public service transformation.



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INTRODUCTION

Digital transformation in public administration has entered a more complex and strategic phase, where technology is no longer merely a supporting tool for routine bureaucratic activities but has become an essential component in improving service quality, efficiency, and evidence-based decision-making. One of the most significant innovations driving this transformation is the Internet of Things (IoT), which enables the interconnection of sensors, devices, and information systems to facilitate real-time data collection and analysis. In the context of public administration, IoT offers opportunities to automate administrative processes, monitor public infrastructure, optimize resource management, and enhance the responsiveness of government institutions (Marr, 2018; Alsaadi & Tubaihat, 2015). Consequently, the adoption of IoT represents a fundamental element of digital governance and smart public service development.

The integration of IoT technologies into public administration has contributed significantly to the emergence of smart governance, characterized by the use of interconnected devices and data analytics to improve public sector performance (Meijer & Bolívar, 2016). Through continuous data collection, governments can monitor environmental conditions, traffic flows, energy consumption, and public facilities more effectively. For example, sensors embedded in public buildings and infrastructure provide real-time information that enables policymakers to implement timely interventions and optimize service delivery (Gil-Garcia et al., 2018). Such capabilities support transparency, accountability, and efficiency, which are essential principles of contemporary public administration. Moreover, IoT-based systems allow governments to shift from reactive to proactive service models by anticipating citizens' needs and identifying problems before they escalate (Anthopoulos, 2017).

Beyond operational efficiency, IoT also enhances public participation and accountability. Data generated by interconnected devices can be integrated into open government platforms, enabling citizens to access information regarding public expenditures, infrastructure conditions, and service performance. This transparency strengthens public trust and promotes collaborative governance between state institutions and society (Mergel, Edelman, & Haug, 2019). Furthermore, IoT technologies facilitate evidence-based policymaking by providing accurate and continuous streams of information that support strategic planning and policy evaluation. Therefore, digital transformation through IoT is not limited to technological modernization but also involves institutional innovation and the reconfiguration of relationships between governments and citizens (Criado, Sandoval-Almazan, & Gil-Garcia, 2018).

However, the increasing adoption of IoT also raises concerns regarding cybersecurity, privacy protection, and ethical governance. Governments are required to ensure that interconnected systems comply with adequate security standards to prevent data breaches and misuse of sensitive information (Kitchin, 2016). Public servants must therefore possess not only technical competencies but also ethical awareness regarding data management and citizens' rights. In this regard, digital literacy and ethical competence become crucial elements in preparing future bureaucrats capable of managing technological innovation responsibly (Lips, 2020). Consequently, public administration education is expected to equip students with interdisciplinary competencies encompassing technology, public policy, ethics, and analytical thinking.

Recent scholarship emphasizes that digital transformation requires new forms of professional readiness among public sector employees and future administrators. Professional readiness encompasses technical capabilities, cognitive understanding, motivation, and ethical awareness necessary for adapting to technological change (Sousa & Rocha, 2019). Public administration students, as prospective bureaucrats, are expected to understand not only how digital systems operate but also their broader implications for social justice, inclusion, and governance. Universities therefore play a strategic role in preparing students to navigate the complexities of digital governance through curriculum innovation and experiential learning (Williamson, Potter, & Eynon, 2019). Integrating IoT literacy into public administration programs contributes to the development of adaptive and critical competencies required in the era of smart government.

In Indonesia, the digitalization of public services has accelerated in line with government initiatives promoting electronic government and smart city development. Nevertheless, disparities in digital competencies remain evident among both public officials and university students. This challenge is particularly relevant in local contexts such as Bone Regency, South Sulawesi, where technological transformation is increasingly integrated into administrative practices and public service activities. Observations indicate that many public administration students possess basic technical skills related to operating digital devices and information systems but still face difficulties in understanding data analytics, ethical considerations, and the social implications of IoT-based governance. Similar findings have been reported by

Mergel et al. (2019), who argue that technological competencies alone are insufficient without critical and ethical capacities.

Field experiences involving public service evaluations, citizen satisfaction surveys, and information system development have provided opportunities for students to engage directly with digital governance practices. Through collaboration with government agencies and academic supervision, students learn to integrate technological tools into decision-making processes and public service innovation. These experiences demonstrate that digital transformation is not solely concerned with administrative efficiency but also requires ethical responsibility and awareness of issues such as privacy protection, digital inequality, and social inclusion (Lips, 2020). Consequently, practical exposure contributes significantly to developing students' cognitive, affective, and psychomotor competencies.

Furthermore, experiential learning enables students to connect theoretical knowledge with real-world administrative challenges. Cognitive dimensions are strengthened through understanding IoT technologies and data analysis; affective dimensions emerge from awareness of ethical and social consequences; while psychomotor dimensions develop through hands-on engagement with digital tools and service innovation projects. This multidimensional learning process contributes to the formation of professional readiness required in increasingly complex and dynamic bureaucratic environments (Sousa & Rocha, 2019). Such readiness is essential for ensuring that future public administrators can effectively respond to rapid technological changes and evolving societal expectations.

Overall, the integration of IoT into public administration highlights the importance of strengthening technological literacy and digital competencies among university students. Digital transformation requires not only mastery of technological tools but also the ability to interpret data, evaluate ethical implications, and formulate responsive public policies. Experiences gained by public administration students in Bone Regency illustrate the importance of combining technological knowledge with practical and ethical perspectives. Therefore, developing professional readiness through IoT literacy and experiential learning represents a strategic step toward preparing adaptive, competent, and socially responsible public servants capable of contributing to digital governance and sustainable public service innovation.

METHOD

This study employed a descriptive qualitative approach with a case study design to obtain an in-depth understanding of the professional readiness of Public Administration students at Cahaya Prima University in responding to Internet of Things (IoT)-based public service digitalization in Bone Regency. A case study approach was selected because it allows researchers to explore contemporary phenomena within their real-life contexts and to capture the interactions between technological literacy, bureaucratic practices, and students' experiences in the field (Yin, 2018; Creswell & Poth, 2018). The participants consisted of 12 undergraduate students from the Public Administration Program enrolled in the 2024–2025 academic years who had actively participated in internships, fieldwork activities, or research projects related to digital public services. Purposive sampling was applied to select information-rich participants who met specific criteria, including previous experience using digital devices or IoT applications, involvement in public service monitoring or policy evaluation projects, and basic knowledge of public administration and digital literacy (Patton, 2015). The object of the study was students' professional readiness, which was examined through three dimensions: cognitive readiness (knowledge and understanding of IoT principles, data analysis, and social implications), affective readiness (motivation, attitudes, and ethical awareness toward digital technologies), and psychomotor readiness (practical skills in operating IoT devices, collecting real-time information, and formulating data-based recommendations). Data were collected through semi-structured interviews lasting between

30 and 60 minutes, participant observation during practical activities, and document analysis of curricula, syllabi, internship reports, and digital literacy materials. Semi-structured interviews enabled participants to describe their experiences, perceptions, and challenges related to IoT implementation in public services, while participant observation facilitated the examination of technical skills, interactions with public officials, and the application of digital technologies in authentic settings (Kvale & Brinkmann, 2015; DeWalt & DeWalt, 2011). Documentary evidence was incorporated to provide contextual understanding and strengthen data triangulation (Bowen, 2009).

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña (2019), consisting of data reduction, data display, and conclusion drawing. Interview recordings and field notes were transcribed verbatim and coded to identify patterns associated with cognitive, affective, and psychomotor dimensions of professional readiness, as well as gaps in technological literacy. Data displays facilitated the organization of themes and the interpretation of relationships among categories, while reflective conclusions enabled the identification of broader implications for public administration education and digital governance. To ensure trustworthiness, triangulation was conducted by comparing evidence obtained from interviews, observations, and documents, and member checking was applied to verify preliminary interpretations with selected participants (Lincoln & Guba, 1985). Ethical considerations were strictly observed by informing participants about the purpose and procedures of the study, obtaining voluntary informed consent, and maintaining confidentiality through the use of pseudonyms and coded identifiers. Methodologically, the qualitative case study approach provided a comprehensive framework for understanding students' experiences and readiness within the context of digital transformation, generating rich and contextually grounded findings regarding technological competencies, ethical awareness, and adaptive capacities required of future public servants (Denzin & Lincoln, 2018; Merriam & Tisdell, 2016). Ultimately, this approach is expected to contribute to the development of strategies for integrating digital literacy, technological ethics, and experiential learning into public administration education, thereby preparing adaptive, critical, and responsible bureaucrats capable of responding to the challenges of IoT-based governance and digital public services.

RESULT AND DISCUSSION

The findings reveal that Public Administration students at Cahaya Prima University possess varying degrees of professional readiness to face Internet of Things (IoT)-based public service digitalization in Bone Regency. Analysis of interviews, observations, and curriculum documents indicates that readiness is manifested through cognitive, affective, and psychomotor dimensions, which interact dynamically and collectively influence students' capabilities in responding to digital transformation.

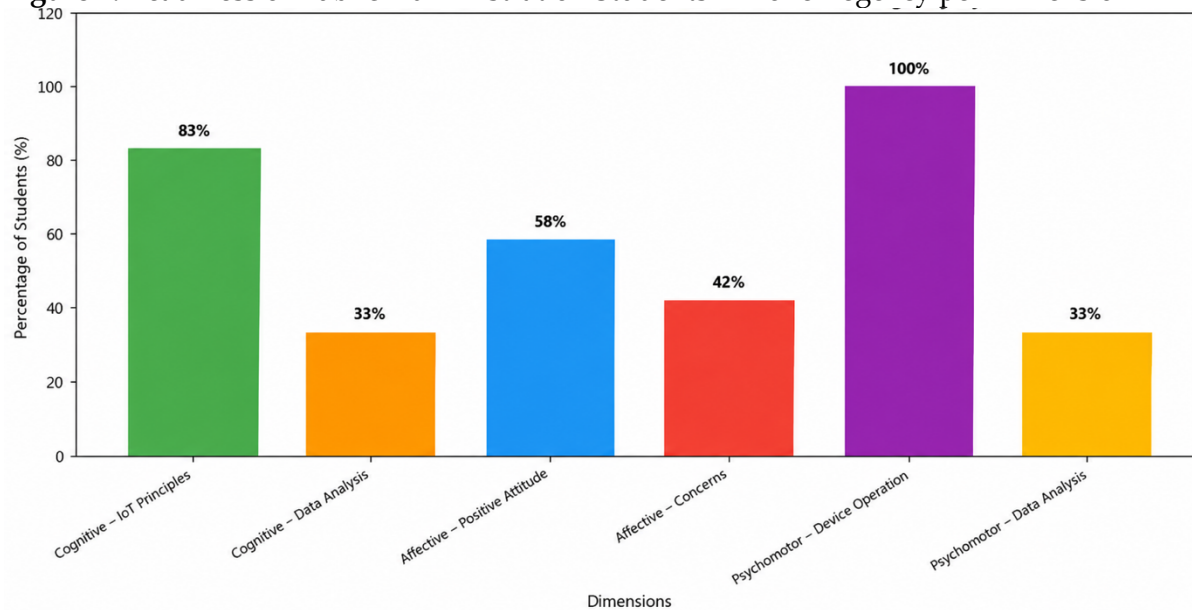
The cognitive dimension demonstrates that students generally possess an initial understanding of IoT concepts and technological functions. Interview results show that all participants were familiar with sensors, networks, and digital monitoring systems, while approximately 83% were able to explain the role of IoT devices in supporting public services such as traffic monitoring, environmental management, and public facility supervision. However, only four participants (33%) could explain how data generated by IoT systems could be utilized for policy formulation and service evaluation. One participant stated:

"I understand how sensors work and how to operate monitoring applications, but I still do not fully understand how the information collected can influence government decisions and improve public services" (I6).

Field observations further revealed that students were capable of operating digital dashboards and monitoring applications but experienced difficulties when interpreting data and relating it to policy analysis. Document analysis also indicated that only a limited

proportion of curriculum materials discussed data analytics and the social implications of digital technologies.

Figure 1. Readiness of Public Administration Students in Bone Regency per Dimension



Source: research results

These findings indicate that students' cognitive readiness remains largely technical and operational. Such results support the argument of Mergel, Edelmann, and Haug (2019), who emphasize that digital transformation requires more than technological proficiency; it also demands analytical capabilities and the ability to integrate digital information into organizational decision-making. Similarly, Sousa and Rocha (2019) argue that future professionals must develop digital competencies that combine technical knowledge with critical thinking and problem-solving skills. Therefore, the limited ability of students to translate IoT-generated information into policy recommendations reflects the need for stronger integration between technological literacy and public policy analysis within public administration education.

The affective dimension reveals that students generally display positive attitudes toward digital innovation. Seven participants (58%) perceived IoT as an opportunity to improve the effectiveness and efficiency of public services, whereas three participants (25%) expressed concerns regarding cybersecurity, privacy, and excessive dependence on automated systems. Two participants (17%) demonstrated ambivalent attitudes, recognizing the benefits of technology while questioning their readiness to assume the ethical responsibilities associated with digital governance. As participant I9 explained:

"IoT makes administrative work faster, but I worry about the misuse of public data and the possibility that important decisions become overly dependent on automated systems."

The existence of these concerns suggests that students have begun to develop ethical awareness regarding technological innovation. However, such awareness remains transitional and requires further reinforcement. This finding corresponds with Kitchin (2016), who argues that the increasing adoption of smart technologies inevitably raises ethical issues concerning privacy, surveillance, and accountability. Likewise, Lips (2020) emphasizes that digital government reforms require public servants who possess not only technical expertise but also ethical sensitivity and public responsibility. Consequently, digital ethics should become an integral component of public administration curricula to ensure that future bureaucrats can manage technological innovations responsibly.

Observations of practical activities demonstrate that students exhibit relatively strong psychomotor competencies. All participants were able to operate IoT devices and digital

monitoring systems, while approximately 75% successfully organized collected information into reports and databases. Nevertheless, only 33% demonstrated the ability to interpret real-time information and formulate recommendations for public service improvement. Students with previous internship experience performed better than those whose learning experiences were limited to classroom simulations.

These findings indicate that students' interaction with technology remains concentrated at the operational level rather than the analytical and strategic level. Similar observations have been reported by Williamson, Potter, and Eynon (2019), who contend that experiential learning and authentic engagement with digital systems are essential for developing higher-order digital competencies. Practical exposure enables students to integrate technical skills with analytical reasoning, thereby preparing them to participate effectively in evidence-based governance.

Another important finding concerns the interaction among cognitive, affective, and psychomotor dimensions. Students with stronger conceptual understanding tended to exhibit greater ethical awareness and more advanced practical competencies. Conversely, students whose knowledge was limited to technical aspects often approached digital technologies pragmatically without considering their social and policy implications. This interaction demonstrates that professional readiness is multidimensional and cannot be reduced to technical competence alone.

Table 1.
Professional Readiness of Public Administration Students toward IoT-Based Public Service Digitalization

Dimension	Indicator	Percentage	Main Findings
Cognitive	Understanding IoT principles	83%	Students understand sensors and digital networks, but have limited policy integration capabilities
Cognitive	Data analysis and policy implications	33%	Few students can translate IoT data into public decision-making
Affective	Positive attitudes toward IoT	58%	Students are optimistic about technological efficiency
Affective	Ethical concerns and ambivalence	42%	Awareness of privacy and technological dependency issues
Psychomotor	Device operation and dashboard utilization	100%	Students demonstrate adequate technical skills
Psychomotor	Data interpretation for policymaking	33%	Analytical and strategic competencies remain limited

Source: research results

Furthermore, observations conducted in government institutions in Bone Regency indicate that digital literacy challenges are not exclusive to university students. Several public officials also experienced difficulties in integrating digital information into service planning and policy processes. This finding suggests that technological literacy gaps constitute broader institutional challenges associated with digital transformation. According to Criado, Sandoval-Almazan, and Gil-Garcia (2018), digital government reforms require organizational learning and capacity building to ensure that technological innovation contributes to improved governance outcomes. Therefore, strengthening digital competencies among students should be accompanied by institutional support and collaboration between universities and government agencies.

Overall, the findings demonstrate that Public Administration students at Cahaya Prima University possess an initial level of professional readiness for IoT-based public service digitalization. Nevertheless, their readiness remains uneven across cognitive, affective, and psychomotor dimensions. Technical competence and motivation are relatively well

developed, whereas analytical abilities, ethical awareness, and policy-oriented thinking remain limited. These findings underline the importance of curriculum reform that integrates IoT literacy, digital ethics, project-based learning, and field experiences. Such integration is essential to prepare future public administrators who are adaptive, critical, and capable of responding to the increasingly complex demands of digital governance and smart public services..

CONCLUSION

This study demonstrates that Public Administration students at Cahaya Prima University possess an initial level of professional readiness for Internet of Things (IoT)-based public service digitalization. Students generally exhibit adequate technical competencies and positive attitudes toward technological innovation, indicating their potential to contribute to digital governance initiatives. Nevertheless, limitations remain in their ability to analyze data, understand ethical implications, and integrate technological information into evidence-based policymaking. The findings further reveal that cognitive, affective, and psychomotor dimensions are closely interconnected and collectively shape students' professional readiness. Existing gaps in technological literacy indicate that digital transformation requires more than operational skills; it also demands analytical capabilities, ethical awareness, and critical thinking. Therefore, public administration education should integrate IoT literacy, digital ethics, and field-based learning experiences to strengthen students' competencies. Such efforts are essential for preparing adaptive, competent, and socially responsible future public servants capable of supporting sustainable digital governance and improving public service quality.

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