A Descriptive Case Study of Digital Leadership Practices in the Agricultural Training Division of a National Government Agency in Central Luzon

ADAMS PAUL M. SORIANO[1], JENNY ROSE A. SORIANO[2]
[1,2] *Graduate School, Nueva Ecija University of Science and Technology*

Abstract- ***This study presents a descriptive case analysis of the digital leadership practices implemented within the Agricultural Training Division of a national government agency in Central Luzon. As digital transformation becomes increasingly vital in enhancing public service delivery, understanding how government institutions lead and adapt to technological changes is essential, particularly in sectors such as agriculture where training services are significant. The research investigates how digital leadership is implemented within the training division, examining six core competencies: embracing digital, facilitating the digital drive, digital adaptiveness and resilience, cultivating a digital culture, digital skills, and digital competitive intelligence. Data were collected through structured survey questionnaires administered to personnel directly involved in agricultural training services. The findings aim to provide insights into the effectiveness of current digital leadership practices, the perceptions of staff, and the key challenges faced in the digital transformation process. The study contributes to the broader understanding of digital leadership within public agricultural institutions and offers recommendations for enhancing leadership frameworks to support sustainable and technology driven capacity building in the agricultural sector..***

Index Terms- ***Digital Leadership, Digital Transformation, Agricultural Training Services, Central Luzon, Philippines***

I. INTRODUCTION

In the agricultural sector, training services are significant for equipping farmers with the knowledge and skills necessary for sustainable development. In the Philippines, these services are a cornerstone of rural development, helping farmers adopt new technologies through structured training, field demonstrations, and advisory support. Such interventions are essential for enhancing productivity, promoting sustainable farming practices, improving food security, and fostering climate resilience and rural empowerment (Inutan et al., 2025).

With the rapid advancement of digital technologies, government agencies are undergoing significant transformation in how they deliver public services. Digital transformation involves significant changes in organizational processes, roles, and service delivery, enhancing efficiency, transparency, and responsiveness (Mergel et al., 2019; Parviainen et al., 2017). In this context, digital leadership in the public sector has emerged as a key factor in ensuring that digital transformation efforts align with public values and enhance service accessibility and quality (Kusanke et al., 2023).

Digital leadership demands new competencies, mindsets, and strategies that enable public institutions to navigate technological change and foster innovation (Larjovuori et al., 2018). Despite growing recognition of its importance, there is limited empirical research on how digital leadership is practiced within Philippine government agencies, especially those delivering agricultural training services. This gap is particularly relevant in Central Luzon, a major agricultural region where national agencies are tasked with providing essential training programs. As digital transformation becomes increasingly significant, understanding how digital leadership is applied within these institutions is important to ensuring the effectiveness and relevance of agricultural training.

This study evaluates digital leadership practices within the agricultural training division of a national government agency in Central Luzon using the six core competencies identified by Munsamy et al. (2023): Embracing Digital, which emphasizes leaders' commitment and collaboration to foster innovation; Facilitating the Digital Drive, focused on creating value, supporting employees, and aligning digital efforts with organizational goals; Digital Adaptiveness and Resilience, highlighting flexibility and support to navigate technological shifts; Cultivating a Digital Culture, promoting an inclusive environment for sustained digital adoption; Digital Skills, covering the technical knowledge and data literacy needed to implement training technologies; and Digital Competitive Intelligence, involving the anticipation of digital risks and market trends to enhance service delivery. These competencies provide a structured framework for analyzing how leadership supports the effective delivery of agricultural training services. The study addresses the research problem of how digital leadership is implemented and experienced within the division. Specifically, it aims to:

- Describe the demographic profile of respondents in terms of age, years in service, and education;
- Identify the challenges the division encounters in implementing digital leadership practices;
- Assess the perceived effectiveness of current digital leadership practices in the delivery of agricultural training services; and
- Examine the digital leadership practices currently implemented within the division, focusing on key leadership competencies such as embracing digital, leadership facilitating the digital drive, digital adaptiveness and resilience, cultivating a digital culture, digital skills, and digital competitive intelligence.

By providing a detailed description of the division's digital leadership practices, this study aims to deepen understanding of how digital strategies are implemented within public institutions delivering agricultural training services. The findings will generate valuable data on the effectiveness of current practices, support evidence-based capacity-building initiatives, and inform policy development aimed at strengthening digital leadership frameworks in the agricultural sector.

II. METHODOLOGY

Research Design

This study employed a descriptive research design to systematically examine the digital leadership practices within the agricultural training division of a national government agency in Central Luzon, particularly in the context of supporting agricultural training services. This design enables the study to present a comprehensive overview of the agency's current practices, focusing on the digital leadership competencies being implemented, their perceived effectiveness, and the challenges encountered during implementation. Additionally, the study explores the demographic profile of selected personnel to provide context for the findings.

Respondents/Participants

The respondents of this study are personnel from the agricultural training division of the selected national government agency in Central Luzon. Participants were selected through purposive sampling, targeting individuals directly involved in the planning, management, or delivery of agricultural training services. Their roles and experiences provide relevant insights into how digital leadership is practiced and perceived within the division.

Data Gathering Tools and Techniques

Data were collected using a structured survey questionnaire developed based on existing validated instruments on digital leadership, specifically adapted from the study of Munsamy et al. (2023). The questionnaire includes items designed to explore various dimensions of digital leadership competencies, gather demographic information, assess perceived effectiveness, and identify challenges in implementing digital leadership. Responses were measured using a seven-point Likert scale, with 1 representing "Strongly Disagree" and 7 representing "Strongly Agree." The survey was administered online through Google Forms for accessibility and ease of distribution.

Statistical Tools and Method of Analysis

The data were analyzed using descriptive statistical methods aligned with the study's objectives. Frequencies and percentages were used to summarize the demographic profile of respondents and the challenges they cited. The mean and standard deviation were calculated to summarize the Likert-scale responses used to assess the perceived level of digital leadership, and to examine the current digital leadership practices implemented within the division.

III. RESULTS AND DISCUSSION

Descriptive statistics were utilized to summarize the results based on the responses of 36 personnel from the Agricultural Training Division of a national government agency in Central Luzon.

Demographic Profile of Respondents

Age Distribution

The demographic analysis reveals a predominantly young workforce within the division, with 25 out of 36 respondents (69.4%) falling within the 20-30 years age bracket. This represents a significant majority of younger professionals who are likely more adaptable to digital technologies and innovation. The remaining respondents are distributed across older age groups: 8 respondents (22.2%) aged 31-40 years, and only 3 respondents (8.3%) aged above 40 years. This age distribution suggests that the agency has a workforce that is naturally inclined toward digital adoption, which could be advantageous for implementing digital leadership practices. This finding supports prior research indicating that younger employees in government agencies exhibit greater digital readiness and adaptability, leading to faster digital adoption and lower resistance to technological change (Bhaskar et al., 2022).

Gender Composition

The gender distribution shows a relatively balanced representation with a slight female majority. Nineteen respondents (52.8%) identified as female, while 17 (47.2%) identified as male. A balanced gender representation is crucial for effective digital leadership, as it promotes diverse viewpoints and minimizes gender-related barriers to technology adoption (Amoussouhoui et al., 2024).

Educational Background

The educational profile demonstrates a highly qualified workforce, with 31 respondents (86.1%) holding Bachelor's degrees and 5 respondents (13.9%) possessing Master's degrees. Notably, no respondents reported having Doctorate degrees or other educational qualifications. This educational background offers a strong foundation for grasping and applying digital leadership principles, as higher education often provides technological exposure and analytical skills, aligning with Nikou et al. (2021) findings that higher educational attainment is positively associated with digital literacy and technology acceptance.

Length of Service

The service tenure analysis reveals that the majority of respondents are relatively new to the agency, with 28 out of 36 (77.8%) having less than 5 years of service. Six respondents (16.7%) have 5-10 years of experience, while only 2 respondents (5.6%) have more than 15 years of service. This pattern suggests a recently recruited workforce that may be more open to change and digital innovation, though it also indicates limited institutional experience in traditional practices.

B. Challenges in Digital Leadership Implementation

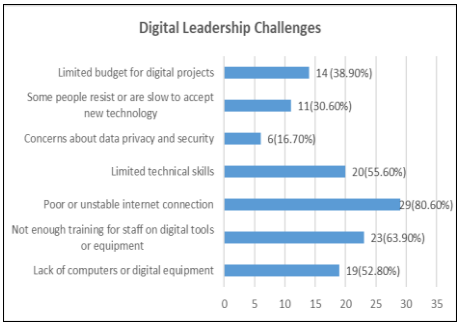

Table 1. Frequency distribution of responses for Challenges in Digital Leadership Implementation

The study identified several key challenges faced by personnel from the Agricultural Training Division of a national government agency in Central Luzon in implementing digital leadership strategies. These challenges were analyzed using frequency and percentage distribution, as summarized in Table 1. The most commonly reported issue was poor or unstable internet connection, cited by 29 out of 36 respondents (80.60%). This finding underscores a critical infrastructural barrier that hinders the effective implementation of digital training services, particultary for accessing online platforms, conducting virtual training sessions, and ensuring seamless communication with stakeholders. The second most cited challenge was inadequate training for staff on digital tools or equipment, reported by 23 respondents (63.90%), followed by limited technical skills, indicated by 20 participants (55.60%).

Furthermore, 19 respondents (52.80%) identified the lack of computers or digital equipment as a significant limitation, pointing to the importance of equipping both trainers and trainees with up-to-date devices. Additional concerns included limited budget allocations for digital projects (38.90%), resistance or slow acceptance of digital innovations (30.60%), and data privacy and security issues (16.70%). While reported by fewer participants, these issues reflect broader institutional and policy-level challenges. The equipment and budget limitations identified align with the research by Ndlovu et al. (2023) who noted that limited budgets and equipment shortages create substantial barriers to implementing digital innovations in government contexts, affecting overall

transformation success. In addition, the resistance to digital innovations, although reported by a smaller percentage, highlights common change management challenges. Resistance to change is a natural response within organizations, regardless of workforce demographics, and must be addressed through strategic change management (Alenezi, 2022).

C. Perceived Effectiveness of Digital Leadership

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Digital leadership has enhanced the delivery of agricultural training.	36	3	7	6.06	1.068	1.140
Digital tools have improved communication and coordination during training.	36	5	7	6.36	.683	.466
Training programs are more accessible due to digital platforms.	36	4	7	6.28	.779	.606
Digital leadership encourages innovation in agricultural services.	36	5	7	6.42	.692	.479
Agricultural training outcomes have improved through digital leadership.	36	4	7	6.08	.841	.707
Valid N (listwise)	36					

Table 2. Descriptive Statistics for Perceived Effectiveness of Digital Leadership

The descriptive statistics indicate a strong level of agreement among respondents regarding the positive impact of digital leadership on agricultural training. All five key indicators recorded high mean scores, suggesting that respondents widely perceive digital leadership as a beneficial factor in enhancing training services.

The statement "Digital leadership encourages innovation in agricultural services" recorded the highest mean score of 6.42, with a standard deviation (SD) of 0.692. This suggests that respondents strongly agree that digital leadership fosters creativity and innovation in agricultural service delivery. The second-highest mean score was 6.36 for "Digital tools have improved communication and coordination during training," with a low SD of 0.683. This consistent response highlights the crucial role digital tools play in improving internal communication and collaboration during training programs. "Training programs are more accessible due to digital platforms" received a mean of 6.28 and an SD of 0.779, indicating that respondents agree digital technologies have improved accessibility, particularly benefiting remote or underserved communities.

Furthermore, the statement "Agricultural training outcomes have improved through digital leadership" had a mean of 6.08 and SD of 0.841, while "Digital leadership has enhanced the delivery of agricultural training" followed closely with a mean of 6.06 and a slightly higher SD of 1.068. These slightly lower but still high scores suggest a strong belief in the positive effects of digital leadership, though some respondents may perceive room for further improvement or ongoing development. Across all indicators, the standard deviations were generally low, demonstrating a high level of consensus among the respondents. Overall, the results suggest that respondents believe that digital leadership practices are making a positive impact on agricultural training services.

D. Digital Leadership Practices Implementation

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
A. Embracing Digital	36	3.80	7.00	5.8889	.68359	.467
B. Leadership Facilitating the Digital Drive	36	5.00	7.00	6.0222	.51664	.267
C. Digital Adaptive ness and Resilience	36	4.00	7.00	6.1296	.75289	.567
D. Cultivating a Digital Culture	36	4.00	7.00	5.8056	.77715	.604
E. Digital Skills	36	4.80	7.00	6.0389	.57335	.329
F. Digital Competitive Intelligence	36	3.00	7.00	5.7037	.99452	.989
Valid N	36					

Table 3. Descriptive Statistics for Digital Leadership Practices Implementation

Table 3 presents the summary of the descriptive statistics for the six competencies of digital leadership. Mean and standard deviation were used to summarize the Likert-scale responses for each competency. The analysis included data from 36 respondents.

a. Embracing Digital

A. Embracing Digital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.80	1	2.8	2.8	2.8
	4.60	1	2.8	2.8	5.6
	4.80	2	5.6	5.6	11.1
	5.40	3	8.3	8.3	19.4
	5.60	5	13.9	13.9	33.3
	5.80	5	13.9	13.9	47.2
	6.00	7	19.4	19.4	66.7
	6.20	3	8.3	8.3	75.0
	6.40	4	11.1	11.1	86.1
	6.80	2	5.6	5.6	91.7
	7.00	3	8.3	8.3	100.0
	Total	36	100.0	100.0	

Table 3. Descriptive Statistics for Embracing Digital

The responses for the variable "Embracing Digital" indicate a generally positive perception among employees regarding their adoption and use of digital technologies. As shown in Table 3, the mean score was 5.89, suggesting that most respondents agreed with statements related to embracing digital tools in their work. The median and mode were both 6.00 ("Agree"), while the standard deviation of 0.68 shows that responses were moderately consistent. A notable portion of respondents selected ratings of

6.00 and above, with 19.4% choosing "Agree" and another 19.4% selecting the highest scores of 6.80 or 7.00, indicating strong confidence in their digital engagement.

However, a small number of respondents rated themselves below the midpoint of the scale, with scores as low as 3.80 ("Somewhat Disagree") and 4.60 ("Neither Agree nor Disagree" to "Somewhat Agree"). These lower scores indicate that although most employees are comfortable using digital tools, some may still lack confidence or sufficient support. This underscores the importance of targeted interventions to improve digital readiness, as Zhan and Xie (2025) point out that while employees are generally receptive to digital change, there is still a need to enhance the effectiveness of digital technologies—particularly through training or coaching sessions aimed at increasing digital literacy among government employees.

b. Leadership Facilitating the Digital Drive

B. Leadership Facilitating the Digital Drive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5.00	1	2.8	2.8	2.8
	5.20	2	5.6	5.6	8.3
	5.40	3	8.3	8.3	16.7
	5.60	2	5.6	5.6	22.2
	5.80	5	13.9	13.9	36.1
	6.00	11	30.6	30.6	66.7
	6.20	4	11.1	11.1	77.8
	6.40	2	5.6	5.6	83.3
	6.60	1	2.8	2.8	86.1
	6.80	1	2.8	2.8	88.9
	7.00	4	11.1	11.1	100.0
	Total	36	100.0	100.0	

Table 4. Descriptive Statistics for Leadership Facilitating the Digital Drive

The results for the variable "Leadership Facilitating the Digital Drive" demonstrate a strong and consistent agreement among respondents regarding the role of leadership in supporting digital transformation. With a mean score of 6.02 as shown in Table 3, the data suggests that employees generally agree that leadership within the agency effectively guides and enables the digital agenda. The median and mode were both 6.00 ("Agree"), and the relatively low standard deviation of 0.52 indicates a high level of consensus among respondents.

Most responses clustered between 5.40 and 6.20, with 30.6% of participants selecting 6.00 ("Agree") and an additional 13.9% rating 5.80. Notably, 11.1% of respondents rated this item a 7.00 ("Strongly Agree"), reflecting strong confidence in leadership's digital decision-making. Very few responses fell below the mid-range, with only one respondent selecting 5.00 ("Somewhat Agree"). These results suggest that leadership is perceived as actively supporting digital change through effective strategies, technological competence, and inclusive decision-making. This aligns with findings from Kusanke et al. (2023), who emphasize that successful digital transformation requires leaders to combine technological skills, strategic vision, and emotional intelligence, while Zhou et al. (2024) highlight the role of leadership in fostering collaboration and strengthening the organization's image to support digital transformation efforts.

c. Digital Adaptiveness and Resilience

C. Digital Adaptiveness and Resilience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4.00	1	2.8	2.8	2.8
	4.33	1	2.8	2.8	5.6
	5.00	3	8.3	8.3	13.9
	5.67	3	8.3	8.3	22.2
	6.00	12	33.3	33.3	55.6
	6.33	1	2.8	2.8	58.3
	6.33	1	2.8	2.8	61.1
	6.67	7	19.4	19.4	80.6
	7.00	7	19.4	19.4	100.0
	Total	36	100.0	100.0	

Table 5. Descriptive Statistics for Digital Adaptiveness and Resilience

The results for "Digital Adaptiveness and Resilience" show a strong and positive perception among respondents regarding their ability to adjust to digital tools and manage change. As shown in Table 3 the mean score was 6.13 , indicating that most participants agreed or strongly agreed with statements about their digital adaptability. The median and mode were both 6.00, and the standard deviation of 0.75 suggests moderate variability but with responses concentrated at the higher end of the scale.

A substantial proportion of respondents (33.3%) rated themselves at 6.00 ("Agree"), while 19.4% selected 6.67 and another 19.4% gave the highest rating of 7.00 ("Strongly Agree"), illustrating high confidence in their resilience to digital change. Only a few respondents rated themselves below the midpoint, with 2.8% selecting 4.00 ("Neither Agree nor Disagree") and 2.8% selecting 4.33, indicating minimal uncertainty or resistance. These findings reflect a workforce that is generally well-prepared to navigate digital transformation, demonstrating flexibility and awareness of the changes needed to succeed in a technology-driven environment. Zhan and Li (2024) found that digital transformation significantly enhances organizational resilience,

highlighting the critical role of continuous learning and adaptation amid rapidly changing digital environments.

d. Cultivating a Digital Culture

D. Cultivating a Digital Culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4.00	1	2.8	2.8	2.8
	4.50	3	8.3	8.3	11.1
	5.00	5	13.9	13.9	25.0
	5.50	4	11.1	11.1	36.1
	6.00	15	41.7	41.7	77.8
	6.50	3	8.3	8.3	86.1
	7.00	5	13.9	13.9	100.0
	Total	36	100.0	100.0	

Table 6. Descriptive Statistics for Cultivating a Digital Culture

The results for "Cultivating a Digital Culture" reveal a generally positive but slightly less enthusiastic perception compared to other digital leadership dimensions. With a mean score of 5.81 as shown in Table 3, most respondents indicated agreement with efforts to create a supportive digital environment. The median and mode were both 6.00, showing that the majority leaned toward "Agree," while the standard deviation of 0.78 suggests moderate variability in responses.

A significant portion of respondents (41.7%) rated this area a 6.00, and 13.9% gave the highest score of 7.00 ("Strongly Agree"), reflecting that over half of the participants recognized positive efforts in developing a digital culture. However, a notable number of respondents gave mid-range ratings—13.9% rated it 5.00 ("Somewhat Agree"), and 11.1% gave 5.50—while smaller portions selected lower scores, such as 4.00 or 4.50, indicating neutrality or uncertainty. The results indicate that while efforts to cultivate a digital culture are recognized, the process remains uneven and ongoing, reflecting findings that cultural transformation is more complex and slower than adopting digital tools, as it requires reshaping mindsets, behaviors, and sustained leadership (Butt et al., 2024).

e. Digital Skills

E. Digital Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4.80	1	2.8	2.8	2.8
	5.00	3	8.3	8.3	11.1
	5.60	5	13.9	13.9	25.0
	5.80	3	8.3	8.3	33.3
	6.00	10	27.8	27.8	61.1
	6.20	5	13.9	13.9	75.0
	6.60	3	8.3	8.3	83.3
	6.80	3	8.3	8.3	91.7
	7.00	3	8.3	8.3	100.0
	Total	36	100.0	100.0	

Table 7. Descriptive Statistics for Digital Skills

The results for "Digital Skills" indicate that respondents generally perceive themselves as competent in using digital tools and technologies relevant to their roles. The mean score was 6.04 as shown in Table 3, while the median and mode were both 6.00, reflecting that most participants selected "Agree" when evaluating their digital capabilities. The standard deviation of 0.57 suggests low variability in responses, indicating a fairly consistent level of confidence in digital skillsets across the group.

A significant proportion of respondents (27.8%) selected 6.00 ("Agree"), with additional clusters of responses around 5.60 (13.9%) and 6.20 (13.9%). Notably, 8.3% gave the highest possible rating of 7.00 ("Strongly Agree"), suggesting that a number of staff feel highly confident in their digital proficiency. Only a few respondents rated themselves below 5.00, such as 4.80 and 5.00, indicating minor uncertainty or gaps in skill. These findings are consistent with research by Calderón et al. (2022), who explored the determinants of digital skills perceptions among young people in Spain. Their study found that self-confidence significantly influences individuals' self-assessment of digital skills, often leading to higher self-perceived competence regardless of actual proficiency levels. This aligns with the observation that a significant proportion of respondents rated themselves highly in digital capabilities.

f. Digital Competitive Intelligence

F. Digital Competitive Intelligence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.00	1	2.8	2.8	2.8
	3.33	2	5.6	5.6	8.3
	4.33	1	2.8	2.8	11.1
	4.67	1	2.8	2.8	13.9
	5.00	3	8.3	8.3	22.2
	5.33	2	5.6	5.6	27.8
	5.67	5	13.9	13.9	41.7
	6.00	12	33.3	33.3	75.0
	6.33	2	5.6	5.6	80.6
	6.67	3	8.3	8.3	88.9
	7.00	4	11.1	11.1	100.0
	Total	36	100.0	100.0	

Table 6. Descriptive Statistics for Digital Competitive Intelligence

The results for "Digital Competitive Intelligence" indicate that respondents generally view themselves as moderately to highly capable in gathering and leveraging digital insights for competitive advantage. The mean score was 5.70 as shown in Table 3, with a median and mode of 6.00, suggesting that many participants selected "Agree" when evaluating their competency in this area. The standard deviation of 0.99 points to a moderate spread in responses, indicating some variability in perceived capability levels.

A substantial portion of respondents (33.3%) selected 6.00 ("Agree"), with additional concentrations around 5.67 (13.9%) and 7.00 (11.1%), indicating strong confidence among several individuals. However, there is a noticeable range of lower scores as well, including ratings such as 3.00 (2.8%), 3.33 (5.6%), and 4.33–4.67 (5.6%), reflecting that a subset of respondents may feel less confident or experienced in this area. The findings suggest that while many individuals demonstrate confidence in using digital tools for competitive purposes, variability in capability may be influenced by differing levels of experience and cognitive ability in interpreting digital intelligence (Sadeghiani et al., 2022).

The survey results demonstrate that the national government agency in Central Luzon has successfully implemented digital leadership practices that positively impact agricultural training services. The combination of a young, educated workforce and strong organizational leadership support has created an environment conducive to digital transformation. While overall implementation is strong, focusing on digital culture development and external competitive intelligence could further enhance the agency's digital leadership capabilities and ultimately improve agricultural training service delivery.

CONCLUSION

The study reveals that the Agricultural Training Division in Central Luzon demonstrates strong digital leadership practices across the six core competencies identified by Munsamy et al. (2023): embracing digital, facilitating the digital drive, digital adaptiveness and resilience, cultivating a digital culture, digital skills, and digital competitive intelligence. A predominantly young, educated workforce, combined with supportive leadership, contributes to a positive environment for digital transformation. Respondents widely recognize the effectiveness of digital tools in enhancing agricultural training services, particularly in improving training delivery, communication, innovation, and accessibility. High mean scores in embracing digital, facilitating the digital drive, and digital adaptiveness and resilience reflect strong commitment and readiness for sustained digital advancement within the division.

Future studies should consider examining digital leadership practices across the entire agency to gain a more comprehensive understanding of how these practices influence organizational performance and service delivery. Such research could identify variations and commonalities among different divisions, uncovering factors that facilitate or hinder digital transformation at a broader institutional level. Additionally, exploring agency-wide strategies for capacity building, infrastructure development, and cultural change would provide valuable insights to support more effective and cohesive digital leadership initiatives throughout the organization.

REFERENCES

[1] Alenezi, M. (2022). Understanding digital government transformation. arXiv. https://arxiv.org/abs/2202.01797

[2] Amoussouhoui, R., Arouna, A., Ruzzante, S., & Banout, J. (2024). Adoption of ICT4D and its determinants: A systematic review and meta-analysis. Heliyon, 10(9), e30210. https://doi.org/10.1016/j.heliyon.2024.e30210

[3] Bhaskar, P., Vinay, M., Chopra, G., & Joshi, A. (2022). E-government adoption and employees' job performance: The moderating role of age as a demographic factor. Electronic Government an International Journal, 18, 237–263. https://doi.org/10.1504/EG.2022.10037881

[4] Butt, A., Imran, F., Helo, P., & Kantola, J. (2024). Strategic design of culture for digital transformation. Long Range Planning, 57(2), Article 102415. https://doi.org/10.1016/j.lrp.2024.102415

[5] Calderón, D., Sanmartín Ortí, A., & Kuric, S. (2022). Self-confidence and digital proficiency: Determinants of digital skills perceptions among young people in Spain. First Monday, 27(4). https://doi.org/10.5210/fm.v27i4.12566

[6] Inutan, S. M. B., Dujali, I. L., Bacus, M. S., Quijano-Pagutayao, A. S., & Sarita, V. B. (2025). The role of agricultural extension in farmers' technology adoption for sustainable agricultural practices in Davao Oriental, Philippines. International Journal of Research and Innovation in Applied Science, 10(4), 150–158. https://doi.org/10.51584/IJRIAS.2025.10040028

[7] Kusanke, K., Kendziorra, J., Pilgenroeder, S., Christmann-Schwaab, T., & Winkler, T. J. (2023). Building digital leadership in the public sector – A literature review. ECIS 2023 Research Papers, 376. https://aisel.aisnet.org/ecis2023_rp/376

[8] Kusanke, K., Pilgenröder, S., Kendziorra, J., & Winkler, T. (2023). Digital leadership in the public sector: Towards a public sector digital leadership competency model.

[9] Larjovuori, R.-L., Bordi, L., & Heikkilä-Tammi, K. (2018). Leadership in the digital business transformation. In Proceedings of the 22nd International Academic Mindtrek Conference (pp. 212–221). https://doi.org/10.1145/3275116.3275122

[10] Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. Government Information Quarterly, 36, Article 101385. https://doi.org/10.1016/j.giq.2019.06.002

[11] Munsamy, M., Dhanpat, N., & Barkhuizen, E. N. (2023). The development and validation of a digital leadership competency scale. Acta Commercii, 23(1), a1057. https://doi.org/10.4102/ac.v23i1.1057

[12] Ndlovu, N., Ochara, N. M., & Martin, R. (2023). Influence of digital government innovation on transformational government in resource-constrained contexts. Journal of Science and Technology Policy Management, 14(5), 960–981. https://doi.org/10.1108/JSTPM-11-2021-0173

[13] Nikou, S., & Aavakare, M. (2021). An assessment of the interplay between literacy and digital technology in higher education. Education and Information Technologies, 26, 3893–3915. https://doi.org/10.1007/s10639-021-10451-

[14] Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: How to benefit from digitalization in practice. International Journal of Information Systems and Project Management, 5, 63–77. https://doi.org/10.12821/ijispm050104

[15] Sadeghiani, A., Shokouhyar, S., & Ahmadi, S. (2022). How digital startups use competitive intelligence to pivot. Digital Business, 2(2), 100034. https://doi.org/10.1016/j.digbus.2022.100034

[16] Zhan, X., & Xie, S. (2025). Linking workplace digitalization to work engagement: Evidence from China public sector organizations. Frontiers in Psychology, 16, 1455250. https://doi.org/10.3389/fpsyg.2025.1455250

[17] Zhan, Y., & Li, W. (2024). Has digital transformation enhanced the resilience of manufacturing enterprises? International Review of Economics & Finance, 96(Part B), 103688. https://doi.org/10.1016/j.iref.2024.103688

[18] Zhou, W., Lyu, Z., & Chen, S. (2024). Mechanisms influencing the digital transformation performance of local governments: Evidence from China. Systems, 12(1), 30. https://doi.org/10.3390/systems12010030