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Research Article

Human Capital and Employee Performance: The Mediating Role of Training and Digital Innovation

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Abstract: The advancement of digitalization requires the Semarang City Population and Civil Registration Office (Disdukcapil) to improve employee performance through human resource management that adapts to technological developments. The implementation of digital-based services is essential to improving the efficiency and quality of public services. One innovation implemented is the Si D'nOK application, which has proven to accelerate and improve the issuance of e-KTP (electronic ID card) cards. This success demonstrates the critical role of digital innovation in supporting organizational performance. However, although employee training is believed to significantly contribute to strengthening human resource capacity and the success of innovations, empirical studies measuring the direct and indirect effects between human resources, training, digital innovation, and employee performance in the context of this agency are still limited. This study aims to analyze the influence of human resources on employee performance at the Semarang City Disdukcapil, with training and digital innovation as mediating variables. The approach used is a descriptive quantitative approach, with a survey method using a questionnaire distributed to all Disdukcapil employees. Data analysis was performed using Partial Least Squares – Structural Equation Modeling (PLS-SEM) using SmartPLS 3 software. The results of the study indicate that human resources have a positive and significant impact on training, digital innovation, and employee performance. Training significantly impacts employee performance, and digital innovation has also been shown to contribute significantly to improved performance. Furthermore, human resources indirectly influence performance through improved training quality and the utilization of digital innovation.

Keywords: Digital innovation, Employee performance, Human capital, Mediating, Training.

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1. Introduction

In an increasingly competitive global era, human resources (HR) have become a key factor in ensuring organizational sustainability and building public trust. The emphasis on HR reflects the growing importance of intangible assets in navigating dynamic change. Investment in HR aims to enhance both short-term and long-term competitiveness through skills development, technological adaptation, and strategic capabilities. Reliable human capital can respond to changes quickly, effectively, and efficiently to maintain competitive advantage (Sutrisno, 2016; Sedarmayati, 2019).

Productivity is a primary indicator of organizational success, measured not only by output but also by the efficiency of resource utilization especially human resources. High-quality HR that is competent, adaptive, and accountable has been proven to drive productivity (Dessler, 2022). Strategic HR management including recruitment, training, and reward sytems

directly contributes to organizational performance (Armstrong & Taylor, 2023). Well-designed training programs enhance technical competencies and work behavior, supporting both efficiency and job satisfaction (Tarigan et al., 2021; Noe et al., 2023). In the public sector, training plays a critical role in improving the quality of public service delivery.

Various empirical studies have shown that training has a significant impact on employee performance. Research by Noe et al. (2023), Jackson et al. (2022), and Lestari & Sari (2021) has demonstrated a positive relationship between training and improved performance. However, not all studies have produced similar results. Siregar (2020) found that training had no significant effect on performance, suggesting that the context and implementation of training can influence its outcomes.

This study was conducted at the Department of Population and Civil Registration (Disdukcapil) of West Semarang City, which is responsible for administering population and civil registration services based on the principles of autonomy and co-administration. One of the performance indicators of Disdukcapil West Semarang is the implementation of the population registration program. The table below presents the realization data of that program indicator.

The number of printed electronic ID cards (E-KTP) has consistently increased year by year. In 2022, from a target of 1,272,828, a total of 1,233,741 were achieved; in 2023, from a target of 1,255,403, 1,250,011 were completed; and in 2024, from a target of 1,288,430, a total of 1,280,090 were realized. A significant increase occurred in 2024, with a realization gap of 30,079 nearly double the previous year's increase of 16,270. This surge coincided with the launch of the Si D'nOK application on August 1, 2024. In light of this phenomenon, this research is considered important to examine performance improvement through training, with digital innovation as a mediating variable at Disdukcapil West Semarang.

2. Literature Review

2.1. Human Capital

Human capital is a concept that encompasses the knowledge, expertise, and skills possessed by individuals, which contribute added value to an organization (Gaol, 2014). Human capital plays a crucial role in decision-making processes, problem-solving, and the achievement of organizational goals.

2.2 Training

Training is a systematic process aimed at improving employees' knowledge, skills, and attitudes to enable them to perform their tasks and responsibilities more effectively and efficiently. Well-designed training not only enhances productivity and work efficiency but also contributes to employee job satisfaction (Noe et al., 2021). In general, training is directed toward meeting organizational needs in facing challenges, improving work quality, and adapting to changes in the work environment.

2.3 Digital Innovation

Innovation is a process or outcome of developing or utilizing knowledge, skills (including technological skills), and experience to create or improve products or processes in a more meaningful way (Sisca et al., 2021). Digital innovation refers to the integration of technology into organizational business processes to enhance efficiency and effectiveness (Nylen & Holmström, 2014). This type of innovation plays a role in accelerating service delivery and increasing work accuracy.

2.4 Employee Performance

Employee performance reflects the level of success of individuals in completing their assigned tasks and responsibilities according to organizational standards. Performance is not merely about output, but also encompasses the process, ethics, and dedication involved in fulfilling one's role. According to Dessler (2022), key performance indicators include the quality of work outcomes, discipline in task execution, ability to collaborate within a team,

and creativity in problem-solving and innovation. Therefore, achieving optimal performance greatly depends on well-planned and continuous human resource management, including training, motivation, and competency development.

Hypothesis Development

Human Capital Positively Affects Training

Human capital reflects the knowledge, skills, and competencies of individuals, which drive the need for training within organizations. Zhang and Liu (2021) state that the higher the quality of human capital, the greater the organization's motivation to provide relevant training. Rahman and Akhter (2022) also emphasize that strong human capital encourages active engagement in training programs. Sari and Wicaksono (2023) add that individuals with higher competencies are more likely to absorb training materials effectively. Based on these studies, the following hypothesis is proposed:

H1: Human capital has a positive effect on training.

Human Capital Positively Affects Digital Innovation

Human capital plays a vital role in promoting digital innovation within organizations. Wijayanti and Kurniawan (2021) argue that high-quality human resources are a fundamental foundation for generating technology-based innovative ideas. Lee and Park (2022) add that individual competencies, such as digital literacy and adaptive capabilities, significantly contribute to the success of digital transformation. Furthermore, Putri and Yusof (2023) found that organizations with strong human capital are better prepared to develop and adopt digital innovations to improve performance. Based on these findings, the hypothesis proposed is:

H2: Human capital has a positive effect on digital innovation.

Human Capital Positively Affects Employee Performance

Human capital is a key factor in determining employee performance quality within organizations. Chahal, Jyoti, and Rani (2016) state that the competencies, skills, and knowledge possessed by individuals directly contribute to optimal performance outcomes. Jogaratnam (2017) also affirms that strong human capital enhances work effectiveness, productivity, and adaptability to change. Therefore, it can be concluded that higher-quality human capital leads to better employee performance. Accordingly, the following hypothesis is proposed:

H3: Human capital has a positive effect on employee performance.

Training Positively Affects Employee Performance

Training is a strategic initiative to enhance employees' competencies in carrying out their responsibilities effectively. Khan et al. (2016) state that appropriate training improves work capabilities and employee efficiency. Jain (2017) adds that structured training programs contribute to productivity improvement. Afroz (2018) found that training directly impacts the quality and performance of individuals in the workplace. Mira and Odeh (2019) reinforce these findings by stating that continuous training enhances both motivation and work outcomes. Based on these studies, the following hypothesis is proposed:

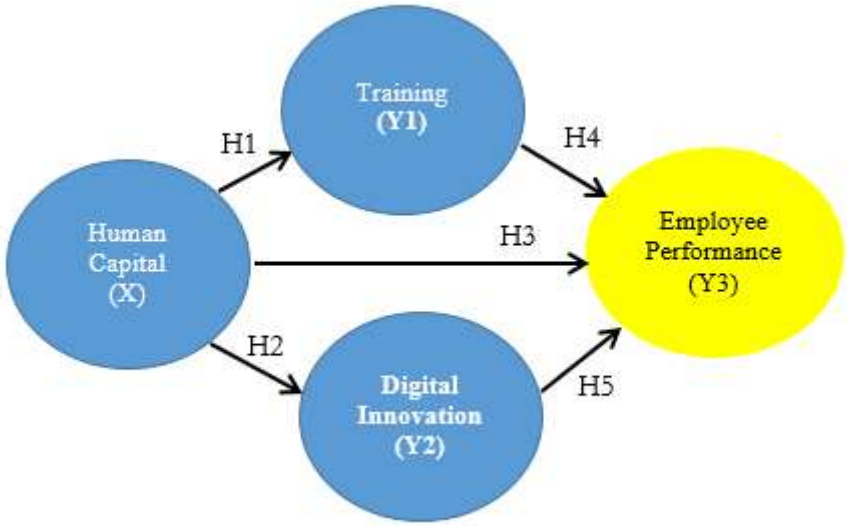
H4: Training has a positive effect on employee performance.

Digital Innovation Positively Affects Employee Performance

Digital innovation plays a key role in enhancing employee efficiency and work effectiveness. Setiawan and Hidayat (2020) state that digital technologies can accelerate work processes and minimize errors. Susanto and Nugroho (2021) add that digital innovation fosters more flexible and responsive work systems to meet organizational needs. Zamzami and Rahmawati (2021) found that digital technology adoption contributes directly to improved productivity and service quality. Hartati and Kurniawan (2023) also reveal that digital integration in work

processes strengthens performance through automation, transparency, and ease of information access. Based on these findings, the hypothesis proposed is:

H5: Digital innovation has a positive effect on employee performance.



Picture 1. Research Model

3. Research Methode

3.1. Methodology

This study employs a quantitative approach with an explanatory research design. The primary objective is to examine the causal relationships among human capital, training, digital innovation, and employee performance. The population of this study consists of all employees of the Department of Population and Civil Registration in Semarang City, with a sample size of 60 respondents selected using saturation sampling technique.

Primary data were collected through questionnaires developed based on indicators of each variable. The research instrument was tested for validity and reliability prior to analysis. To assess the relationships among variables, the study utilized the Partial Least Squares - Structural Equation Modeling (PLS-SEM) method with the assistance of SmartPLS 3.0 software.

3.1.1. Research instrument and measurements

The questionnaire in this study used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Human capital was measured using four dimensions (Gaol, 2014): knowledge, skills, experience, and adaptability, developed into 20 indicators. Training was measured through four dimensions (Sutrisno, 2016): material effectiveness, methods, training duration, and task relevance, expanded into 18 indicators. Digital innovation was assessed using four dimensions (Nylen & Holmstrom, 2014): technology utilization, digital flexibility, ease of use, and quality system integration, comprising 25 indicators. Employee performance was measured with five dimensions (Hasibuan, 2016): work quality, quantity, timeliness, initiative, and responsibility, consisting of 15 indicators.

3.2. Data Analysis

This research utilizes the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique, which offers a comprehensive multivariate approach for simultaneously assessing both measurement and structural relationships within the conceptual framework (Hair et al., 2019). The SEM-PLS framework consists of two key components: the measurement model and the structural model (Hair et al., 2019). The measurement model is evaluated using outer loadings (with a threshold of ≥ 0.6) and the Average Variance Extracted (AVE), which should be ≥ 0.5 to confirm convergent validity (Hair et al., 2019). Construct reliability is tested through composite reliability, which is considered acceptable between 0.7 and 0.9 (Hair et al., 2019). The measurement model focuses on verifying the validity and

reliability of reflective indicators, while the structural model is used to examine R^2 values and the strength of path coefficients (Hair et al., 2019).

4. Result And Discussion

4.1 . Measurement Model

Initially, the measurement model was evaluated to determine the constructs' reliability and validity. As shown in the table below, all item outer loading values surpassed the recommended threshold of 0.7 (Hair et al., 2017). The analysis revealed that both composite reliability and average variance extracted (AVE) values exceeded the minimum standards of 0.7 and 0.5, respectively, indicating that the constructs exhibit strong reliability and convergent validity (see Table 1) (Hair et al., 2017). In addition, discriminant validity was assessed using the Fornell-Larcker criterion, which demonstrated that each latent variable's AVE square root was greater than its correlations with other constructs (see Table 2) (Fornell & Larcker, 1987). These results confirm that the measurement model meets the required validity and reliability standards.

Table 1. Loading, Composite Reliability, AVE

Construct/Item	Loading	Composite Relaibility	AVE
Human Capital		0.962	0.558
HC1 <- HC	0.720		
HC2 <- HC	0.746		
HC3 <- HC	0.759		
HC4 <- HC	0.750		
HC5 <- HC	0.783		
HC6 <- HC	0.754		
HC7 <- HC	0.801		
HC8 <- HC	0.791		
HC9 <- HC	0.825		
HC10 <- HC	0.829		
HC11 <- HC	0.715		
HC12 <- HC	0.723		
HC13 <- HC	0.739		
HC14 <- HC	0.723		
HC15 <- HC	0.707		
HC16 <- HC	0.797		
HC17 <- HC	0.777		
HC18 <- HC	0.751		
HC19 <- HC	0.879		
HC20 <- HC	0.701		
Training		0.962	0.589
TR1 <- TR	0.771		
TR2 <- TR	0.777		
TR3 <- TR	0.748		
TR4 <- TR	0.839		
TR5 <- TR	0.784		
TR6 <- TR	0.777		
TR7 <- TR	0.771		
TR8 <- TR	0.800		

TR9 <- TR	0.856		
TR10 <- TR	0.738		
TR11 <- TR	0.828		
TR12 <- TR	0.733		
TR13 <- TR	0.706		
TR14 <- TR	0.761		
TR15 <- TR	0.705		
TR16 <- TR	0.859		
TR17 <- TR	0.902		
TR18 <- TR	0.868		
Digital Inovation		0.981	0.673
DI1 <- DI	0.777		
DI2 <- DI	0.786		
DI3 <- DI	0.719		
DI4 <- DI	0.738		
DI5 <- DI	0.825		
DI6 <- DI	0.856		
DI7 <- DI	0.862		
DI8 <- DI	0.847		
DI9 <- DI	0.791		
DI10 <- DI	0.838		
DI11<- DI	0.891		
DI12 <- DI	0.898		
DI13 <- DI	0.924		
DI14 <- DI	0.823		
DI15<- DI	0.755		
DI16 <- DI	0.867		
DI17 <- DI	0.838		
DI18 <- DI	0.830		
DI19 <- DI	0.873		
DI20 <- DI	0.858		
DI21 <- DI	0.788		
DI22 <- DI	0.879		
DI23<- DI	0.704		
DI24<- DI	0.874		
DI25<- DI	0.870		
Employee Performance		0.944	0.533
EP1 <- EP	0.779		
EP2 <- EP	0.733		
EP3<- EP	0.706		
EP4 <- EP	0.745		
EP5 <- EP	0.757		

EP6 <- EP	0.816
EP7 <- EP	0.759
EP8 <- EP	0.788
EP9 <- EP	0.801
EP10 <- EP	0.809
EP11 <- EP	0.886
EP12 <- EP	0.711
EP13 <- EP	0.759
EP14 <- EP	0.771
EP15 <- EP	0.798

Sumber : data primer yang diolah, 2025

4.2 Structural Model

Prior to assessing the structural model, the inner model was examined using the Goodness of Fit (GoF) analysis to ensure that the proposed model meets the required standards for validity, reliability, and suitability for further analysis (Tenenhaus et al., 2005). The GoF index is calculated by taking the square root of the product of the average AVE and the average R^2 values (Hair et al., 2019). According to established benchmarks, GoF values can be categorized as small (0.10–0.24), medium (0.25–0.35), and large (≥0.36) (Hair et al., 2019). The GoF value obtained in this study is 0.614, which exceeds the high threshold of 0.377. This suggests that the model constructs exhibit strong measurement quality and that the data used provide a solid fit for the proposed hypothetical framework (see Table 2).

Table 2 Goodness of Fit

Variable	AVE	R^2
Human Capital	0.558	
Training	0.589	0.775
Digital Innovation	0.673	0.738
Employee Performance	0.533	0.822
Average Score	0.588	0.778
AVE x R^2		0.458
GoF = √(AVE x R^2)		0.678

Sumber : data primer yang diolah, 2025

The evaluation of the inner model is conducted by interpreting the R^2 values to assess the model's accuracy. Human capital was found to explain 77.5% (R^2 = 0.775) of the variance in training, and 73.8% (R^2 = 0.738) of the variance in digital innovation. Furthermore, employee performance is explained by human capital, training, and digital innovation with an R^2 value of 0.822, indicating that 82.2% of the variation in employee performance is accounted for by these variables, while the remaining variance is attributed to other factors (see Table 2).

The structural model's Goodness of Fit was further tested using the predictive relevance (Q^2) value. A Q-square value greater than zero indicates that the model has predictive relevance. The R-square values for each endogenous variable in this study are presented in the calculation below:

Q2 = 1- (1 - R1)(1 - R2) (1 – R3)
Q2 = 1- (1 - 0.775)(1 - 0.738) (1 - 0.822)
Q2 = 1- (0.225)(0.262)(0.178)
Q2 = 1- 0.010
Q2 = 0.9895 atau 98,95%

The results show that the predictive relevance value (Q^2) is 0.9895, which is greater than 0. This indicates that 98.95% of the variance in the dependent variable, employee performance, can be explained by the independent variables used in the model. Therefore, the model demonstrates strong predictive relevance.

The next section discusses the hypothesis testing results. The analysis reveals that human capital has a positive and significant effect on training (β = 0.881; p-value = 0.000), supporting H1. Human capital also positively and significantly influences digital innovation (β = 0.859; p-value = 0.000), confirming H2. In addition, human capital has a significant positive effect on employee performance (β = 0.614; p-value = 0.000), validating H3. Training has a positive and significant effect on employee performance (β = 0.528; p-value = 0.000), supporting H4. Lastly, digital innovation significantly and positively affects employee performance (β = 0.350; p-value = 0.000), confirming H5 (see Table 3).

Table 3 Hypothesis Testing

	Hipotesis	β	t-value	p-value	Hasil
H1	Human Capital -> Training	0.881	9.722	0.000	Accepted
H2	Human Capital -> Digital Innovation	0.859	8.910	0.000	Accepted
H3	Human Capital -> Employee Performance	0.614	4.293	0.000	Accepted
H4	Training -> Employee Performance	0.528	4.143	0.000	Accepted
H5	Digital innovation -> Employee Performance	0.350	3.589	0.002	Accepted
Indirect					
	Human Capital -> Training -> Employee Performance	0.341	3.252	0.011	Accepted
	Human Capital -> Digital Innovation -> Employee Performance	0.325	3.141	0.018	Accepted

Sumber : data primer yang diolah, 2025

The results of the indirect effect testing show that *human capital influences employee performance through training* with a coefficient of 0.341 and a p-value of 0.011. This indicates that training successfully mediates the relationship between human capital and employee performance. Furthermore, *human capital also affects employee performance through digital innovation*, with a coefficient of 0.325 and a p-value of 0.018, suggesting that digital innovation also serves as an effective mediator in the relationship between human capital and employee performance.

5. Discussion

These findings indicate that human capital serves as the foundational pillar in shaping competent and productive employees. Employees who possess adaptability, sufficient knowledge, and technical skills are proven to be more responsive to training and better prepared to leverage digital technologies.

Training not only enhances technical capabilities but also fosters a mindset shift and promotes a more dynamic work culture. This supports the view of Noe et al. (2021), who argue that training acts as a catalyst for organizational change.

The mediating role of digital innovation in the relationship between human capital and performance suggests that digitalization is a vital tool for optimizing employee outcomes. The implementation of digital-based public service applications such as Si D'nOK not only accelerates service delivery but also establishes a more accountable work system.
These results are consistent with Rogers' (2003) Diffusion of Innovations theory, which posits that the effective adoption of technology is strongly influenced by individual readiness and organizational support.

6. Managerial Implications

These findings underscore the role of human capital as a fundamental cornerstone in developing competent and productive employees. Individuals equipped with adaptability, adequate knowledge, and technical expertise demonstrate greater responsiveness to training and a higher readiness to embrace digital technologies.

Training not only enhances technical proficiency but also cultivates a shift in mindset and nurtures a more dynamic organizational culture. This aligns with the perspective of Noe et al. (2021), who emphasize that training functions as a catalyst for organizational transformation.

The mediating role of digital innovation in the relationship between human capital and employee performance highlights digitalization as a critical enabler in optimizing work outcomes. The deployment of digital-based public service platforms, such as Si D'nOK, not only expedites service delivery but also fosters a more transparent and accountable work environment. These findings are in line with Rogers' (2003) Diffusion of Innovations theory, which asserts that successful technology adoption is significantly shaped by both individual readiness and organizational support.

Referensi

Afroz, S. (2018). Training interventions and employee efficiency: Evidence from the service sector. *Service Sector Performance Journal, 12*(1), 101–117.

Armstrong, M., & Taylor, S. (2023). *Armstrong's handbook of human resource management practice* (15th ed.). Kogan Page.

Chahal, H., Jyoti, J., & Rani, S. (2016). Impact of human capital on employee performance: Evidence from Indian organizations. *International Journal of Business Performance, 8*(4), 215–230.

Dessler, G. (2022). *Human resource management* (16th ed.). Pearson Education.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Gaol, C. L. (2014). *Human capital: Konsep dan praktik manajemen sumber daya manusia*. Grasindo.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). SAGE Publications.

Hartati, D., & Kurniawan, B. (2023). Integrating digital innovation into employee workflows to boost organizational performance. *Journal of Innovation in Public Sector, 10*(1), 34–50.

Hasibuan, M. S. P. (2016). *Manajemen sumber daya manusia*. Bumi Aksara.

Jackson, S. E., Schuler, R. S., & Werner, S. (2022). *Managing human resources*. South-Western College Publishing.

Jain, R. (2017). Effectiveness of structured training on organizational performance: An empirical study. *International Journal of Training and Performance Management, 9*(2), 78–93.

Jogaratnam, G. (2017). Human capital and work performance: A comprehensive review of competencies and outcomes. *Journal of Organizational Effectiveness, 11*(2), 55–70.

Khan, M., Ahmed, T., & Ali, S. (2016). Impact of training programs on employee performance and productivity. *Journal of Training and Development Research, 4*(3), 145–160.

Lee, C., & Park, H. (2022). Competence, adaptability, and digital innovation: The mediating role of human capital. *Technology & Human Capital Journal, 14*(2), 89–105.

Noe, R. A., Hollenbeck, J. R., Gerhart, B., & Wright, P. M. (2021). *Fundamentals of human resource management* (9th ed.). McGraw-Hill Education.

Nylen, D., & Holmström, J. (2014). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons, 58*(1), 57–67. https://doi.org/10.1016/j.bushor.2014.09.001

Putri, R. A., & Yusof, M. (2023). Human capital readiness and digital innovation adoption in public sector organisations. *Public Sector Innovation Review, 7*(1), 45–59.

Rahman, M., & Akhter, S. (2022). The role of human capital in enhancing employee training and development outcomes: Evidence from public sector organizations. *International Journal of Training and Development, 26*(1), 45–60.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Sari, N. M., & Wicaksono, A. (2023). Pengaruh modal manusia terhadap efektivitas pelatihan karyawan di sektor publik. *Jurnal Manajemen Sumber Daya Manusia, 11*(1), 78–89.

Setiawan, A., & Hidayat, R. (2020). Inovasi digital sebagai pendorong efisiensi kinerja pegawai di sektor publik. *Jurnal Ilmu Administrasi Publik, 17*(2), 115–128.

Siregar, R. (2020). Efektivitas pelatihan dalam meningkatkan hasil kerja. *Jurnal Evaluasi Kinerja, 6*(1), 33–40. https://doi.org/10.15575/jim.v1i2.10316

Sisca, D. R., Utami, W., & Hidayah, R. (2021). Manajemen inovasi dalam era digital. *Jurnal Ilmu Manajemen, 9*(1), 17–26.

Susanto, T., & Nugroho, Y. (2021). The effect of technology adoption on work effectiveness: Evidence from digital innovations in the workplace. *International Journal of Work and Digital Transformation, 5*(1), 44–59.

Sutrisno, E. (2016). *Manajemen sumber daya manusia* (2nd ed.). Kencana Prenada Media.

Wijayanti, A., & Kurniawan, D. (2021). The role of human capital in fostering digital innovation: Studi empiris. *Journal of Digital Innovation and Strategic Management, 5*(3), 123–137.

Zamzami, F., & Rahmawati, S. (2021). Role of digital innovation in enhancing service quality and employee productivity. *Service Innovation Review, 8*(3), 99–115.

Zhang, L., & Liu, H. (2021). Human capital investment and organizational training effectiveness: A study of knowledge-intensive industries. *Journal of Human Resource Development, 15*(2), 112–126.