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Digital Transformation and Human Resource Competence As Drivers of Operational Effectiveness: The *Mediating Role* of Organizational Innovation in Port Operations

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ABSTRACT

Organizations operating in operational-intensive environments, such as port services, face increasing pressure to enhance operational effectiveness amid rapid digital disruption. Although digital transformation initiatives have been widely implemented, many organizations struggle to translate technological adoption into tangible operational improvements. This study aims to examine the effects of digital transformation and human resource (HR) competence on operational effectiveness, with organizational innovation positioned as a mediating variable. This research applies a quantitative explanatory design using a causal approach. Data were collected through structured questionnaires distributed to 200 respondents, consisting of 100 internal employees and 100 external port service users at PT Pelindo (Persero) Regional 2, Sunda Kelapa Branch. The data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS software to evaluate the measurement and structural models and test the proposed hypotheses. The findings reveal that digital transformation has a positive and significant effect on organizational innovation, and that HR competence also significantly influences it. Furthermore, organizational innovation has a strong positive effect on operational effectiveness and partially mediates the relationship between digital transformation and HR competence. These results indicate that technological initiatives and human resource capabilities contribute more effectively to operational performance when supported by strong organizational innovation mechanisms.

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1. INTRODUCTION

The acceleration of digital technology has fundamentally reshaped organizational operations across industries, compelling firms to integrate digital systems into core business processes. In operational-intensive sectors such as port services, digital transformation is no

longer merely an option but a strategic imperative to improve efficiency, service reliability, transparency, and competitiveness [1]. Port operations involve highly complex and interdependent activities, including vessel scheduling, cargo handling, terminal management, and logistics coordination, all of which require high levels of accuracy, speed, and data integration [2]. However, despite significant investments in digital infrastructure, many port organizations still struggle to achieve optimal operational effectiveness. This condition raises a critical research problem: why do digital transformation initiatives not automatically translate into improved operational effectiveness?.

Prior studies emphasize that digital transformation enhances organizational performance by enabling process automation, real-time data analytics, and improved decision-making [3]. Similarly, human resource (HR) competence has been recognized as a key determinant of organizational success in the digital era, particularly in terms of digital literacy, adaptability, and learning capability [4], [5]. Further argue that dynamic human competencies must support digital capabilities to create sustainable competitive advantages. Nevertheless, existing empirical research tends to examine digital transformation and HR competence as direct predictors of organizational performance, with limited attention to the mediating mechanisms that translate these capabilities into operational outcomes. In particular, empirical evidence within state-owned service organizations and port operations remains scarce. This gap indicates the need to investigate organizational innovation as a bridging mechanism between digital initiatives, HR competence, and operational effectiveness.

Organizational innovation refers to the organization's ability to implement new ideas, processes, and systems that enhance efficiency and productivity [6]. Raisch and Krakowski [7] argue that innovation enables organizations to manage complexity and improve task execution in dynamic environments. In the context of port services, innovation may manifest in process reengineering, digital service integration, and improved coordination mechanisms. However, previous studies have rarely explicitly positioned organizational innovation as a mediating variable linking digital transformation and HR competence to operational effectiveness, particularly in port operations. Thus, this study contributes theoretically by integrating digital transformation theory [8], dynamic capability theory [9], and innovation-performance linkage perspectives [10] into a comprehensive structural model.

Based on the identified research gap, this study aims to examine: (1) the effect of digital transformation on organizational innovation, (2) the effect of HR competence on organizational innovation, (3) the effect of organizational innovation on operational effectiveness, and (4) the mediating role of organizational innovation in the relationship between digital transformation, HR competence, and operational effectiveness within port operations.

This research proposes that digital transformation and HR competence do not, in themselves, guarantee operational effectiveness unless they are effectively channeled through structured organizational innovation processes. By empirically testing this mediation model using Partial Least Squares–Structural Equation Modeling (PLS-SEM), the

study seeks to provide a clearer explanation of how digital and human capabilities are converted into measurable operational improvements.

The expected contribution of this research is twofold. Theoretically, it enriches the literature by clarifying the mediating role of organizational innovation in operation-intensive service organizations and addressing a gap in prior studies that predominantly focus on direct effects. In practice, the findings are expected to provide strategic guidance to port operators and policymakers in designing integrated digital transformation programs supported by HR development and structured innovation management systems. Ultimately, this study aspires to support the development of more adaptive, innovative, and operationally effective port organizations in the era of digital disruption.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Digital Transformation and Organizational Innovation

Digital transformation is the integration of digital technologies into organizational processes to drive fundamental changes in operations and value creation. HR competence reflects employees' knowledge, skills, and adaptability in utilizing technology effectively. Organizational innovation represents the organization's ability to implement new ideas, processes, and systems that improve performance. Operational effectiveness refers to the extent to which organizations achieve objectives efficiently and effectively. Based on theoretical and empirical studies, the following hypotheses are proposed:

Digital transformation is a strategic process that involves integrating digital technologies across all aspects of an organization to create fundamental changes in how it operates and delivers value. Digital transformation is not limited to technology adoption alone; it also encompasses changes in business processes, organizational structures, and decision-making patterns. Recent studies indicate that digital transformation serves as a major driver of organizational innovation, as digital technologies enable organizations to develop new business models, enhance flexibility, and accelerate innovation processes.

Jiakui et al. [11] emphasize that digital transformation directly influences an organization's capability to generate sustainable innovation. This argument is reinforced by Mu et al. [12], who state that digital transformation promotes innovation through the utilization of data, advanced technologies, and digital organizational capabilities. Therefore, digital transformation is expected to positively influence organizational innovation.

H1: Digital transformation has a positive and significant effect on organizational innovation.

Human Resource Competence and Organizational Innovation

Human resource competence reflects the ability of individuals within an organization, including their knowledge, skills, and work attitudes, to support the achievement of organizational objectives. In the digital era, human resource competence extends beyond technical skills to include adaptability, continuous learning capability, and digital literacy. According to Jaiswal and Tyagi [13], human resource competence is a key factor in supporting organizational innovation, particularly in the context of digital transformation.

Competent human resources are better equipped to utilize digital technologies effectively and integrate them into innovative work processes. Furthermore, Warner and Wäger (2021) argue that adequate human resource capabilities are a critical prerequisite for organizations to generate impactful and sustainable innovation. Based on this theoretical reasoning, human resource competence is expected to positively influence organizational innovation.

H2: Human resource competence has a positive and significant effect on organizational innovation.

Organizational Innovation and Operational Effectiveness

Organizational innovation refers to an organization's ability to create and implement changes that enhance overall performance. Innovation in processes, systems, and managerial practices is believed to improve both efficiency and operational effectiveness. Recent empirical research demonstrates that organizational innovation directly improves operational outcomes.

Abdulhameed and Al-Kubaisy [14] argue that organizational innovation enables organizations to manage complexity more effectively and improve task execution. In addition, Nuryana et al. [15] highlight that organizational innovation plays a crucial role in increasing productivity and operational performance. In the context of port operations, innovative organizational practices are expected to streamline workflows, optimize resource utilization, and enhance service effectiveness.

H3: Organizational innovation has a positive and significant effect on operational effectiveness.

3. METHOD

This study used a combination of sampling techniques: simple random sampling for internal respondents and purposive sampling for external respondents. The study population consisted of internal employees and external port service users involved in operational activities at PT Pelindo (Persero) Regional 2, Sunda Kelapa Branch. This study applied a combination of sampling techniques, including simple random sampling for internal respondents and purposive sampling for external respondents, to select participants based on predefined criteria. Data were collected using structured questionnaires measured on a Likert scale.

Data analysis was conducted using Partial Least Squares–Structural Equation Modeling (PLS-SEM). The analysis stages included descriptive statistics, evaluation of the outer model (validity and reliability), evaluation of the inner model (R^2 and path coefficients), and hypothesis testing. In this study, the sample size was determined using the Slovin formula. The Slovin formula is commonly used to estimate the minimum required sample size when the total population size is known, but detailed population characteristics are not fully known. This formula is particularly useful in quantitative research involving relatively large populations, as it allows researchers to obtain a representative sample with an acceptable level of accuracy.

According to Sugiyono [16], a sample is a subset of the population that reflects the population's overall characteristics. The Slovin formula helps ensure that the selected sample adequately represents the population while maintaining statistical efficiency. In this research, the margin of error (e) was set at 5 percent, a commonly accepted value in social science research that balances precision and feasibility.

The Slovin formula is expressed as follows:

$$n = N / (1 + N e^2)$$

where n represents the sample size, N represents the population size, and e represents the margin of error.

With a population of 132 internal employees and a margin of error of 5 percent (0.05), the sample size was calculated as follows:

$n = 132 / (1 + 132 \times 0.05^2)$

$n = 132 / (1 + 0.33)$

$n = 132 / 1.33$

$n = 99.25 \approx 100$ respondents

The study population consisted of two groups of respondents: internal and external. Internal respondents comprised permanent employees of PT Pelindo (Persero) Regional 2, Sunda Kelapa Branch, totaling 132 employees. The sample size for internal respondents was determined using the Slovin formula, with a 5 percent margin of error (0.05). Based on this calculation, the minimum required sample size was approximately 100 respondents. Therefore, 100 internal respondents were selected using simple random sampling. External respondents included port service users, such as shipping companies, shipping agents, cargo owners, and other parties directly involved in port operations. A total of 100 external respondents were selected using a purposive sampling technique to capture users' perspectives on digital service implementation and operational effectiveness. In total, this study involved 200 respondents: 100 internal and 100 external. This sample size exceeds the minimum requirements for Partial Least Squares–Structural Equation Modeling (PLS-SEM) analysis and ensures adequate statistical power for hypothesis testing. The sample selection procedure was conducted through the following steps:

a. Compiling a list of all permanent employees resulted in a total population of 132 individuals.
b. Assigning a unique identification number from 1 to 132 to each member of the population.
c. Using a random number generator, such as the RAND() function in Microsoft Excel, 100 identification numbers were randomly selected from the list of 132 internal employees.
d. Employees whose identification numbers were selected were designated as research respondents, while the remaining individuals were retained as reserve respondents in the event of non-response.

Table 1. Operational Definition of Variables

Variable	Operational Definition	Indicators	Source
Digital Transformation (X1)	The process of utilizing digital technologies to enhance efficiency, effectiveness, and innovation in the company's operational activities.	1. Implementation of digital systems (PTOS-M, PHINNISI) 2. Work process efficiency 3. Adaptation to technology 4. Integration of operational data	Nuryana et al. (2024)
Human Resource Competence (X2)	The abilities, skills, and work attitudes of employees are necessary for performing tasks effectively in achieving organizational objectives.	1. Knowledge 2. Skills 3. Work attitude 4. Ability to adapt to technology	Baihaqi Ammy (2025)
Organizational Innovation (Z)	The organization's capability to develop and implement new ideas that enhance efficiency and value in work processes.	1. Support for new ideas 2. Process innovation 3. Improvement in service quality 4. Application of innovative technologies	Hamzali (2022)
Operational Effectiveness (Y)	The level of organizational success in achieving operational objectives through efficient and productive use of available resources.	1. Timeliness of task completion 2. Work productivity 3. Efficiency in resource utilization 4. Achievement of operational targets	Maysarah (2023)

Measurement Scale

All indicators in this study were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), reflecting respondents' levels of agreement with the questionnaire statements. The operational definitions and measurement indicators were developed based on established theories and previous empirical studies to ensure strong conceptual validity. The measurement model adopted in this research emphasizes causal relationships among variables through the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach. This approach is particularly suitable for analyzing complex relationships among latent variables and for research that focuses on prediction and theory development. Accordingly, the operationalization of variables in this study is not only theoretically grounded but also methodologically consistent with prior studies that have demonstrated validity in examining the effects of digital transformation and technology-based service systems (Hidajat & Ananda, 2024).

4. RESULTS AND DISCUSSION

Population is defined as a general area consisting of objects or subjects that possess certain qualities and characteristics, as determined by the researcher, to be studied, from which conclusions are drawn [16]. The population in this study comprises two groups of respondents: internal and external. Internal respondents comprise all permanent employees of PT Pelindo (Persero) Regional 2, Sunda Kelapa Branch, totaling 132 employees. These employees are distributed across several organizational units, including the Commercial Division**,** the Operations and Engineering Division, the Business Compliance Division, and the Finance and Human Resources (HR) Division**.** External respondents include port service users at PT Pelindo (Persero) Regional 2, Sunda Kelapa Branch, including shipping companies, shipping agents, cargo owners, and other parties that directly use port operational

services. The inclusion of external respondents aims to obtain users' perspectives on service quality**,** operational effectiveness, and the impact of the company's digital transformation.

Smart PLS Descriptive Statistical Test

According to Sugiyono [16], a research variable is anything in any form determined by the researcher to be studied in order to obtain information about it, from which conclusions are then drawn. In quantitative research, variables are used to measure cause-and-effect relationships among the phenomena under investigation. This study involves four main variables**,** which are classified as follows: a**.** Independent variables (X_1, X_2)**:** X_1 = Digital Transformation, X_2 = Human Resource (HR) Competence b. Intervening variable (Z)**:** Z = Organizational Innovation c. Dependent variable (Y)**:** Y = Operational Effectiveness

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean
Digital Transformation	200	3	5	4.13
HR Competence	200	3	5	4.22
Organizational Innovation	200	3	5	4.19
Operational Effectiveness	200	3	5	4.18
Valid N	200			

Based on the descriptive statistics, the number of valid observations in this study included 200 valid observations, consisting of 100 internal and 100 external respondents. The measurement results for each research variable are presented as follows. The Digital Transformation variable has a mean of 4.13, with a minimum of 3 and a maximum of 5. This indicates that respondents generally perceive the implementation of digital transformation to be high. The HR Competence variable has the highest mean value among all variables, namely 4.22, with a minimum of 3 and a maximum of 5. This suggests that respondents perceive the organization's human resource competence as very high. The Organizational Innovation variable has a mean of 4.19, indicating that respondents perceive organizational innovation as high. Furthermore, the Operational Effectiveness variable has a mean of 4.18, indicating a high level of operational effectiveness within the organization. Overall, the descriptive statistics indicate that all research variables fall within the high to very high category, suggesting positive perceptions from respondents regarding digital transformation, human resource competence, organizational innovation, and operational effectiveness.

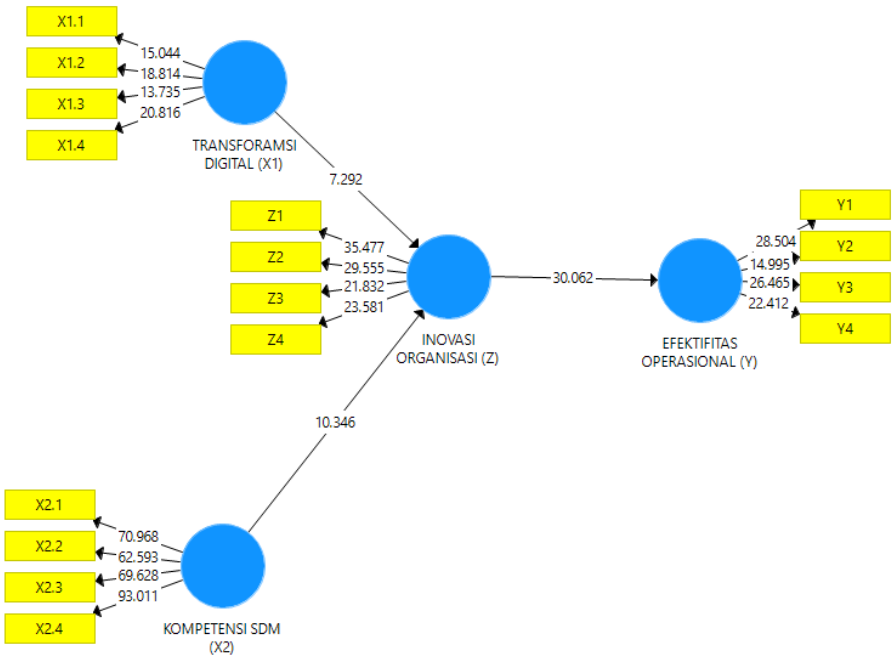

Figure 1. Loading Factor Results

Validity and Reliability Test

Reliability testing aims to assess the level of internal consistency of indicators in measuring a latent construct. In the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach, construct reliability reflects the extent to which indicators within a construct produce stable and consistent measurement results. According to Hair et al. (2021), construct reliability in PLS-SEM should be evaluated using Composite Reliability (CR) as the primary measure, with Cronbach's Alpha as a supporting measure. Composite Reliability is considered more appropriate in the PLS-SEM context because it accounts for differences in indicator loadings when measuring latent constructs, thereby providing a more accurate estimate of reliability than Cronbach's Alpha, which assumes equal indicator weights.

Table 3. Validity and Reliability

Matrix	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Digital Transformation	0.753	0.753	0.844	0.575
HR Competence	0.929	0.933	0.950	0.825
Organizational Innovation	0.840	0.843	0.893	0.675
Valid N : 200				

Based on the results of data processing using SmartPLS with a total of 200 respondents, the following reliability and validity values were obtained:

1. Cronbach's Alpha: measures the lower limit of the reliability value of a variable and is acceptable if the value is> 0.6
2. Composite reliability: measures the real value of the reliability of a variable and is acceptable if the value is> 0.7
3. Average Variance Extracted (AVE) is acceptable if the value is above 0.5

The Cronbach's Alpha values for all constructs range from 0.75 to 0.93, indicating satisfactory internal consistency. According to Hair et al. (2021) and Sarstedt et al. (2022), Cronbach's Alpha values of 0.60 or higher are considered acceptable, particularly in exploratory research or model development studies, provided that the Composite Reliability values meet the required threshold.

Hypothesis Test

Table 4. Hypothesis Test

	Hypothesis	Coefficient	Sample Mean	Standard Deviation	t Statistic	p value	Decision
H1	Digital transformation has a positive and significant effect on organizational innovation	0.496	0.490	0.060	2.163	< 0.001	Supported
H2	Human resource competence has a positive and significant effect on organizational innovation.	0.516	0.516	0.049	10.346	< 0.001	Supported
H3	Organizational innovation has a positive and significant effect on operational effectiveness.	0.834	0.832	0.028	30.062	< 0.001	Supported

DISCUSSION

Digital Transformation has a significant effect on Organizational Innovation.

The results of this study indicate that digital transformation has a positive and significant effect on organizational innovation. This finding is consistent with [2], who argue that digital transformation encourages organizations to develop new ways of working, accelerate decision-making, and create technology-based innovations. The implementation of integrated digital technologies enables organizations to respond to environmental changes more adaptively and innovatively.

Human Resource Competence and Organizational Innovation

The positive effect of human resource competence on organizational innovation reinforces the findings of [3], which were further extended in the post-2020 context by Nefianto [17]. These studies emphasize that digital competencies, learning capabilities, and human resource adaptability are key factors in fostering organizational innovation. Without competent human resources, digital transformation initiatives may fail to generate optimal innovation outcomes [18].

Organizational Innovation and Operational Effectiveness

The results of this study indicate that organizational innovation has a significant effect on operational effectiveness. This finding is consistent with the arguments of Artanto et al. [19], who state that innovation in organizational processes, systems, and structures directly contributes to improvements in efficiency and operational effectiveness.

The Mediating Role of Organizational Innovation

The mediating role of organizational innovation reinforces the views of Belabas [20], who argues that the success of digital transformation and improvements in human resource

competence do not automatically lead to enhanced performance. Instead, these improvements must be channeled through well-managed innovation processes. Accordingly, organizational innovation serves as a strategic linkage between digital transformation, human resource competence, and operational effectiveness.

This study used a structured quantitative approach to examine the relationships among digital transformation, human resource (HR) competence, organizational innovation, and operational effectiveness in port operations. The discussion section elaborates on the stages of data processing, model evaluation, validation procedures, and the interpretation of findings, demonstrating how the expected research outcomes were systematically obtained [21].

The research began with data collection using structured questionnaires distributed to 200 respondents, consisting of 100 internal employees and 100 external port service users. The measurement instruments were developed based on established theoretical constructs from prior studies, ensuring content validity. All indicators were measured using a five-point Likert scale to capture respondents' perceptions. Before testing the structural relationships, the data were screened to ensure completeness and consistency [22]. Descriptive statistical analysis indicated that all variables were perceived as high, suggesting that digital transformation, HR competence, organizational innovation, and operational effectiveness were well recognized within the organizational context [23].

The next stage involved evaluating the measurement model (outer model) using Partial Least Squares–Structural Equation Modeling (PLS-SEM). Convergent validity was assessed using factor loadings and Average Variance Extracted (AVE). All constructs achieved AVE values above the recommended threshold of 0.50, indicating that the indicators sufficiently explained their respective latent variables [24]. Reliability testing was conducted using Cronbach's Alpha and Composite Reliability (CR). The CR values exceeded 0.70, confirming strong internal consistency among indicators. These results demonstrate that the measurement model was statistically valid and reliable, allowing further analysis of the structural model [25].

Subsequently, the structural model (inner model) was evaluated to assess its predictive power and to test hypotheses. The coefficient of determination (R^2) values indicated moderate to strong explanatory capability for organizational innovation and operational effectiveness. Path coefficient analysis and bootstrapping procedures were conducted to test the significance of direct and indirect relationships. The bootstrapping results revealed that digital transformation significantly influences organizational innovation, and that HR competence also does so. Furthermore, organizational innovation showed a strong positive effect on operational effectiveness, as indicated by a high t-statistic and a p-value below 0.001.

To assess mediation effects, indirect path analysis was performed. The results confirmed that organizational innovation partially mediates the relationship between digital transformation and operational effectiveness, as well as between HR competence and operational effectiveness. This means that digital initiatives and HR capabilities improve operational performance both directly and indirectly through innovation mechanisms. The mediation analysis strengthens the theoretical assumption that technological investment and

human capital development require structured innovation processes to generate tangible operational outcomes [26].

Overall, the research process demonstrates that rigorous data processing, measurement validation, and structural model testing are essential to ensure empirical robustness. The integration of statistical validation and theoretical grounding confirms that organizational innovation functions as a strategic mechanism that translates digital transformation and HR competence into improved operational effectiveness. These findings provide a clearer explanation of how digital and human resource capabilities interact in complex operational environments, such as port operations.

5. CONCLUSION

Conclusion

This investigation confirms that integrating digital initiatives and developing workforce capabilities are decisive factors in strengthening organizational performance. The study demonstrates that operational effectiveness is not determined solely by technological adoption or employee expertise, but by the organization's capacity to transform both into sustainable innovation. In this context, innovation functions as a strategic conduit that aligns technological change with human capability, thereby creating measurable improvements in efficiency, service quality, and goal attainment. The empirical model exhibits adequate explanatory and predictive strength, indicating that the proposed framework is robust for understanding organizational performance enhancement in digitally driven environments.

From a theoretical standpoint, this study enriches the resource-based and dynamic capability perspectives by empirically illustrating how digital infrastructure and human capital interact through innovation mechanisms to influence operational outcomes. It advances the discourse on digital transformation by positioning organizational innovation as an essential integrative construct rather than a peripheral outcome.

Managerially, the findings highlight that systematic competency development programs must accompany investment in advanced technologies. Organizations are encouraged to design continuous training, digital literacy enhancement, and adaptive leadership strategies to ensure that technological systems are effectively utilized. Policymakers and institutional leaders may also consider formulating strategic roadmaps that synchronize digital adoption with innovation-oriented organizational cultures.

Several limitations frame the interpretation of this study. First, the research design relies on cross-sectional data, which restricts the ability to capture long-term causal dynamics. Second, the analysis focuses on a specific organizational or sectoral context, potentially limiting generalizability across industries or geographical regions. Third, measurement indicators are primarily perception-based, which may introduce subjective bias despite statistical validation procedures. Finally, external variables such as organizational culture, leadership style, or market turbulence were not incorporated into the structural model.

Subsequent studies are encouraged to adopt longitudinal approaches to examine the sustainability of innovation-driven operational improvements over time. Expanding the model by incorporating moderating variables such as organizational culture, digital maturity

level, or leadership orientation may also provide deeper explanatory insights. Comparative studies across sectors or countries would enhance the framework's generalizability.

For the broader community, this research offers practical insight into how institutions can navigate digital disruption responsibly and strategically. By demonstrating that technology must be harmonized with human capability and innovative processes, the study contributes to a more comprehensive understanding of sustainable organizational development in the digital era.

Recommendation

Port operators are encouraged to strengthen integrated digital transformation strategies that are embedded in core port operations, including vessel traffic management, cargo handling, terminal operations, and port service administration. Digital initiatives should be designed to improve interoperability among port systems (e.g., terminal operating systems, billing systems, and customer service platforms), rather than implemented as isolated technological solutions. Continuous development of human resource competence is essential for port operators, particularly in enhancing digital skills, operational analytics capabilities, and adaptability to technological change. This can be achieved through structured training programs, certification in port-related digital systems, on-the-job learning, and the cultivation of a strong learning-oriented organizational culture to support digital port operations. Port operators should establish a structured innovation management system that actively involves employees across operational, technical, and administrative functions. Such a system should facilitate the generation, testing, and implementation of innovations across port processes, safety, service efficiency, and customer experience, ensuring that these initiatives translate into tangible improvements in operational effectiveness.

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REFERENCES

[1] Navi Muda Priyatna, "Transformasi Digital: Efisiensi dan Inovasi dalam Manajemen Operasional," *Economic Reviews Journal*, vol. 3, no. 3, Sep. 2024, doi: 10.56709/mrj.v3i3.525.

[2] E. Ahyani and E. M. Dhuhani, "Transformasi Digital dalam Manajemen Perkantoran Pendidikan: Sebuah Kajian Literatur," *Jurnal Visionary : Penelitian dan Pengembangan dibidang Administrasi Pendidikan*, vol. 12, no. 1, p. 205, Apr. 2024, doi: 10.33394/vis.v12i1.10785.

[3] P. C. Verhoef *et al.*, "Digital transformation: A multidisciplinary reflection and research agenda," *J. Bus. Res.*, vol. 122, pp. 889–901, Jan. 2021, doi: 10.1016/j.jbusres.2019.09.022.

[4] M. Sarstedt, J. F. Hair, and C. M. Ringle, "'PLS-SEM: indeed a silver bullet' – retrospective observations and recent advances," *Journal of Marketing Theory and Practice*, vol. 31, no. 3, pp. 261–275, Jul. 2023, doi: 10.1080/10696679.2022.2056488.

[5] A. Mutaqin, Y. O. Armi Djemat, R. Budianto, P. Strategi Operasi Darat Pasisi Dikreg LXIV, S. Staf dan Komando Tentara Nasional Indonesia Angkatan Darat, and K. Kunci, "Pengembangan Sistem Informasi Geospasial Militer Oleh Direktorat Topografi Angkatan Darat Dalam Rangka Mendukung Tugas Operasi Militer," vol. 13, no. 1, pp. 89–93, 2025, doi: 10.37081/ed.v13i1.6474.

[6] H. M. S. Turnip, "Peran Strategis Teknologi Informasi Dan Komunikasi Dalam Operasi Militer TNI AD," *Jurnal Mahatvavirya*, vol. 12, no. 2, pp. 120–131, Sep. 2025, doi: 10.63824/jmp.v12i2.342.

[7] S. Raisch and S. Krakowski, "Artificial Intelligence and Management: The Automation–Augmentation Paradox," *Academy of Management Review*, vol. 46, no. 1, pp. 192–210, Jan. 2021, doi: 10.5465/amr.2018.0072.

[8] D. Giarimpampa, R. Meier, T. F. Bissyande, V. Lenders, and J. Klein, "Exploring the Role of Artificial Intelligence in Enhancing Security Operations: A Systematic Review," *ACM Comput. Surv.*, vol. 58, no. 3, pp. 1–38, Feb. 2026, doi: 10.1145/3747587.

[9] D. Singh, A. Muneeb, S. Singh, K. Choksi, A. B. Mirza, and F. Luo, "Powering the Sea: Challenges and Trends in Tidal Energy Integration, Power Converter Technology, and the Path Forward," *IEEE Access*, vol. 13, pp. 187155–187186, 2025, doi: 10.1109/ACCESS.2025.3625578.

[10] B. Alshammari and M. Mahinderjit Singh, "A Systematic Literature Review on Tackling Cyber Threats for Cyber Logistic Chain and Conceptual Frameworks for Robust Detection Mechanisms," *IEEE Access*, vol. 13, pp. 67661–67692, 2025, doi: 10.1109/ACCESS.2025.3552689.

[11] C. Jiakui, J. Abbas, H. Najam, J. Liu, and J. Abbas, "Green technological innovation, green finance, and financial development and their role in green total factor productivity: Empirical insights from China," *J. Clean. Prod.*, vol. 382, p. 135131, Jan. 2023, doi: 10.1016/j.jclepro.2022.135131.

[12] Saw. Mu. S. Haque, "The Impact Of Remote Work On Hr Practices: Navigating Challenges, Embracing Opportunities," *European Journal of Human Resource Management Studies*, vol. 7, no. 1, Aug. 2023, doi: 10.46827/ejhrms.v7i1.1549.

[13] D. Jaiswal and A. Tyagi, "Effect of high performance work practices on service innovative behavior," *Tourism Review*, vol. 75, no. 2, pp. 382–401, Sep. 2019, doi: 10.1108/TR-07-2018-0101.

[14] A. Abbood Abdulhameed and S. A.-D. Al-Kubaisy, "The Effect of Knowledge Upgrading on Business Continuity:A Field Research in Private Colleges and Universities in Baghdad," *Journal of Economics and Administrative Sciences*, vol. 29, no. 136, pp. 1–15, Jun. 2023, doi: 10.33095/jeas.v29i136.2601.

[15] A. Nuryana, Setya Yuwana, Rachmawati Novaria, and V. R. Handoko, "LAMDIK Policy and Its Impact on Education Quality," *Jurnal Administrasi Publik Public Administration Journal*, vol. 15, no. 1, pp. 99–113, Jun. 2025, doi: 10.31289/jap.v15i1.14306.

[16] Sugiyono, "Metode Penelitian Kuantitatif Kualitatif Dan RD," 2022.

[17] T. Nefianto, "Strategi Transformasi Digital Untuk Penguatan Manajemen Organisasi," *Jurnal Sosial Teknologi*, vol. 5, no. 10, pp. 4026–4031, Oct. 2025, doi: 10.59188/jurnalsostech.v5i10.32469.

[18] A. Syaputra, M. D. Ananda, M. J. R. Tovarel, Y. Apriyanto, and V. F. Sanjaya, "Strategi Inovasi Dalam Meningkatkan Competitive Advantage Di Era Digital," *JURNAL MANAJEMEN DAN BISNIS*, vol. 3, no. 2, pp. 121–132, Dec. 2024, doi: 10.36490/jmdb.v3i2.1489.

[19] Dicky Artanto, Hasan Ibadin, and Suwadi, "Penerapan Evaluasi CIPP (Context, Input, Process,Product) Dalam Program Rintisan Madrasah Unggul Di MTsN 1 Yogyakarta," *Al-fahim : Jurnal Manajemen Pendidikan Islam*, vol. 5, no. 1, pp. 68–82, Feb. 2023, doi: 10.54396/alfahim.v5i1.543.

[20] W. Belabas, "Moving Toward More Inclusive Government Communication in an Era of Superdiversity," *Adm. Soc.*, vol. 55, no. 10, pp. 1952–1973, Nov. 2023, doi: 10.1177/00953997231190570.

[21] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," *European Business Review*, vol. 31, no. 1, pp. 2–24, Jan. 2019, doi: 10.1108/EBR-11-2018-0203.

[22] J. F. Hair, G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, and S. Ray, "An Introduction to Structural Equation Modeling," 2021, pp. 1–29. doi: 10.1007/978-3-030-80519-7_1.

[23] M. Matthews, "PLS-SEM: The Holy Grail for Advanced Analysis," 2018.

[24] Shahid Mahmood and Raja Irfan Sabir, "From Digital Service Excellence to Enduring Customer Relationships: Analyzing the Mediating Effect of Customer Satisfaction Between E-Banking Services Quality and Customer Loyalty," *International Journal of Management Research and Emerging Sciences*, vol. 15, no. 3, Sep. 2025, doi: 10.56536/ijmres.v15i3.803.

[25] D. Ivanov, A. Tsipoulanidis, and J. Schönberger, "Basics of Supply Chain and Operations Management," 2021, pp. 3–19. doi: 10.1007/978-3-030-72331-6_1.

[26] Afridah and Muhlisah Lubis, "The Role of Communication and Employee Engagement in Promoting Inclusion in the Workplace: A Case Study in the Creative Industry," *Feedback International Journal of Communication*, vol. 1, no. 1, pp. 1–15, Mar. 2024, doi: 10.62569/fijc.v1i1.8.