



The Effect Of Digital Literacy On Digital Readiness Among Tirtonadi Terminal Employees: The Mediating Role Of Digital Competence

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Abstract: *This study examines the effect of digital literacy on digital readiness among employees of Tirtonadi Terminal, Surakarta, and tests digital competence as a mediating mechanism. A quantitative explanatory design was used with 120 employees selected from a population of 172 through simple random sampling. Data were collected using a five-point Likert questionnaire covering digital literacy, digital competence, and digital readiness, and were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The measurement model met convergent validity, discriminant validity, and reliability criteria. Digital literacy significantly increased digital competence ($\beta = 0.711$; $t = 12.302$; $p < 0.001$) and digital readiness ($\beta = 0.740$; $t = 14.262$; $p < 0.001$), while digital competence significantly improved digital readiness ($\beta = 0.485$; $t = 6.070$; $p < 0.001$). The indirect effect was also significant ($\beta = 0.345$; $t = 4.931$; $p < 0.001$), indicating partial mediation. The findings show that literacy provides the cognitive and technical foundation for digital adaptation, while competence converts that foundation into work-related capability. Public transport organizations should therefore combine digital-literacy development with practical competence training to strengthen employee readiness for continuing digital transformation.*

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Introduction

Digital transformation changes both organizational systems and the capabilities expected from employees. In public transportation, electronic ticketing, cashless payments, real-time passenger information, and digital attendance require staff to use technology reliably while maintaining service continuity. Digital transformation reshapes organizational practices

and institutional arrangements (Vial, 2019; Hinings et al., 2018), while Gfrerer et al. (2021) show that employee readiness can differ substantially within the same organization. Tirtonadi Terminal in Surakarta is a relevant setting because its operations already use ticket vending machines, e-money, real-time gate information, and retina-based attendance. These systems make employee readiness a practical requirement rather than an abstract organizational goal.

Digital literacy provides the foundation for adaptation. Ng (2012) describes it through technical, cognitive, and social-emotional dimensions, meaning that employees must not only operate devices but also evaluate information, communicate responsibly, and understand digital risks. In public-service work, those abilities affect service accuracy, passenger assistance, and data handling. Lopes et al. (2023) found that digital-skills training strengthens public-sector workers' confidence and preparedness, while Bilan et al. (2023) showed that civil servants' digital skills are closely associated with readiness for electronic interaction. Digital literacy should therefore be understood as a work capability rather than simple familiarity with devices.

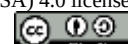
Digital competence translates that foundation into applied capability. The DigComp framework includes information and data literacy, communication and collaboration, digital-content creation, safety, and problem solving (Carretero et al., 2017). Ilomäki et al. (2016) emphasize that competence combines knowledge, skills, attitudes, and contextual judgment, while Falloon (2020) distinguishes foundational literacy from the integrated ability to perform effectively with technology. An employee may understand a digital system yet still struggle to troubleshoot it, organize data, respond to an update, or integrate it into routine service. Competence may therefore explain how literacy becomes practical readiness.

Digital readiness refers to employees' preparedness to accept, use, and adapt to technology within changing work procedures. Gfrerer et al. (2021) place readiness within organizational transformation and highlight differences in how staff perceive and handle digital change. Evidence remains limited in operational public-transport settings, where employees work under time pressure and must respond directly to system problems while assisting passengers. This context makes it important to separate what employees know from what they can perform and how prepared they are to apply technology consistently.

This study tests a mediated model in which digital literacy affects digital readiness directly and indirectly through digital competence. The mechanism is consistent with evidence that digital skills deepen through task-oriented practice (van Laar et al., 2020) and with findings that digital literacy supports readiness for organizational change (Çulhaoğlu Uludağ, 2023). Four hypotheses were examined: digital literacy positively affects digital readiness (H1); digital literacy positively affects digital competence (H2); digital competence positively affects digital readiness (H3); and digital competence mediates the effect of digital literacy on digital readiness (H4). The study contributes workplace evidence from public transportation and offers guidance for digital workforce development.

Research Methods

A quantitative, explanatory, cross-sectional design was used. The population comprised 172 Tirtonadi Terminal employees, and 120 respondents were selected through simple random sampling after sample size determination using the Slovin formula with a 5% margin of error. Data were collected through a five-point Likert questionnaire. Digital literacy was measured with 11 items adapted from Ng (2012); digital competence used eight items based on DigComp (Carretero et al., 2017); and digital readiness used nine work-context items adapted from Gfrerer et al. (2021). The constructs covered technical and cognitive literacy, information



management, collaboration, digital safety, problem solving, and cognitive, affective, and behavioral readiness.

PLS-SEM with SmartPLS 4 was used to estimate the direct and mediated relationships. The measurement model was evaluated using indicator loadings, Average Variance Extracted (AVE), Heterotrait-Monotrait Ratio (HTMT), Cronbach's alpha, and composite reliability. Loadings of at least 0.70, AVE above 0.50, HTMT below 0.90, and reliability values above 0.70 were treated as acceptable; the HTMT criterion followed Henseler et al. (2014). Structural assessment included SRMR, NFI, R^2 , f^2 , and Q^2 , following PLS-SEM guidance (Hair et al., 2021).

The model treated digital literacy as the exogenous construct, digital competence as the mediator, and digital readiness as the endogenous construct. The analytical sequence first established measurement quality and then evaluated explanatory power, predictive relevance, direct paths, and the indirect effect.

Table 1. Measurement Model Assessment

Construct / Pair	Validity Evidence	Reliability / HTMT
Digital Literacy	Loading 0.769–0.848; AVE 0.653	α 0.947; ρ_c 0.954
Digital Competence	Loading 0.776–0.860; AVE 0.685	α 0.934; ρ_c 0.946
Digital Readiness	Loading 0.706–0.830; AVE 0.609	α 0.919; ρ_c 0.933
Literacy–Competence	Discriminant validity	HTMT 0.752
Competence–Readiness / Literacy–Readiness	Discriminant validity	HTMT 0.823 / 0.792

Hypotheses were tested with 5,000 bootstrap resamples. Paths were significant when t exceeded 1.96 and p was below 0.05. Mediation was assessed by comparing the direct effect of digital literacy on readiness with its indirect effect through competence; significance of both effects indicated partial mediation.

Result and Discussion

All 120 questionnaires were suitable for analysis. Digital literacy had the highest overall mean (3.893), followed by digital competence (3.858) and digital readiness (3.838). Employees reported strong digital communication and collaboration (mean = 3.992) but weaker ability to distinguish accurate from inaccurate information (3.813). Competence was strongest for organizing passenger and transaction data (4.258) and weakest for independently adapting to system updates and learning new technology (3.508). Readiness was strongest for understanding how digital transformation changes procedures (4.211), while motivation to learn new technology was lower (3.430). The pattern suggests that routine digital interaction is established, but critical evaluation, autonomous learning, and affective acceptance still need strengthening.

The measurement model met all validity and reliability criteria. Loadings ranged from 0.769–0.848 for digital literacy, 0.776–0.860 for digital competence, and 0.706–0.830 for digital readiness. AVE values were 0.653, 0.685, and 0.609. Cronbach's alpha values were

0.947, 0.934, and 0.919, while composite reliability values were 0.954, 0.946, and 0.933. HTMT ranged from 0.752 to 0.823. These results confirm that the three constructs are empirically distinguishable and measured consistently.

Table 2. Structural Model and Predictive Assessment

Metric	Value	Interpretation
SRMR	0.050	Acceptable model fit
NFI	0.845	Acceptable comparative fit
R ² Digital Competence	0.505	Moderate explanatory power
R ² Digital Readiness	0.664	Moderate-to-strong explanatory power
Q ² Digital Competence	0.500	Strong predictive relevance
Q ² Digital Readiness	0.538	Strong predictive relevance

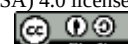
The structural model had acceptable explanatory and predictive performance. SRMR was 0.050 and NFI was 0.845. Digital literacy explained 50.5% of digital competence ($R^2 = 0.505$), while literacy and competence jointly explained 66.4% of digital readiness ($R^2 = 0.664$). Q^2 values were 0.500 for competence and 0.538 for readiness. Effect sizes were 1.021 for literacy on competence, 0.230 for literacy on readiness, and 0.346 for competence on readiness. The model therefore captures a meaningful capability pathway rather than only statistically significant associations.

Digital literacy had a positive and significant direct effect on digital readiness ($\beta = 0.740$; $t = 14.262$; $p < 0.001$), supporting H1. Employees with stronger technical, cognitive, and social-emotional literacy were more prepared to use digital systems and adapt to changing procedures. In Tirtonadi Terminal, this capability is relevant to real-time information, e-money transactions, ticket vending, and digital communication. Literacy can reduce uncertainty by giving employees the knowledge required to understand system functions, assess information, and participate more confidently in technology-mediated service.

Digital literacy also significantly increased digital competence ($\beta = 0.711$; $t = 12.302$; $p < 0.001$), supporting H2. This was the strongest capability-building relationship. The result supports Falloon's (2020) distinction between literacy as a foundation and competence as integrated performance, and it aligns with van Laar et al. (2020) and Althubyani (2024), who emphasize the development of digital competence through knowledge, practice, and contextual factors. Employees who understand digital information and technology risks are better positioned to develop troubleshooting, data management, safe information handling, and independent adaptation skills.

Digital competence significantly affected digital readiness ($\beta = 0.485$; $t = 6.070$; $p < 0.001$), supporting H3. Employees able to manage digital information, collaborate through platforms, protect data, solve technical problems, and adapt to updates were more prepared to integrate technology into routine work. The relatively low mean for independent adaptation to new systems is therefore important: readiness may remain vulnerable when staff understand change but still depend on assistance to perform unfamiliar tasks. This interpretation is consistent with evidence that digital literacy and technological competence strengthen digital work readiness (Lopes et al., 2023; Bilan et al., 2023; Hidayah & Andjarwati, 2025).

The indirect effect of digital literacy on digital readiness through digital competence was positive and significant ($\beta = 0.345$; $t = 4.931$; $p < 0.001$), supporting H4. Because the direct effect remained significant, competence acts as a partial mediator. The result indicates two



complementary pathways: literacy directly strengthens understanding and acceptance, while also enabling employees to build practical competence that further improves readiness. This mechanism explains why general digital-awareness programs may not be sufficient. Employees need opportunities to convert knowledge into repeated task performance through practice, troubleshooting, and real operational use.

For Terminal Tirtonadi, workforce development should combine critical digital-information literacy with hands-on practice for ticket vending machines, e-money procedures, real-time passenger information, digital safety, and scenario-based troubleshooting. The lowest descriptive scores identify two priorities: independent adaptation to system updates and motivation to learn new technology. Recurring micro-training, peer mentoring, guided simulations, and rapid support during system changes can address these gaps. Because the model explains 66.4% of readiness, future studies should also consider organizational support, digital leadership, and training climate as additional determinants.

The results also clarify the conceptual relationship among the three constructs. Digital literacy, digital competence, and digital readiness are positively related, but the measurement model shows that they are not the same capability. Literacy represents the ability to access, interpret, evaluate, and communicate digital information; competence represents the ability to perform technology-supported tasks; and readiness represents preparedness to integrate those capabilities into changing work routines. The significant mediation effect provides empirical support for this sequence. Rather than treating readiness as an automatic consequence of technology exposure, the findings indicate that employees become more ready when foundational literacy is converted into practical competence. This interpretation extends the workplace relevance of digital-capability research, which has often been concentrated in educational contexts, and shows why operational organizations need to assess both understanding and performance when introducing new systems. In public transportation, the distinction is consequential because service reliability depends on whether employees can act effectively when digital systems are used under real-time operational pressure.

The study also has implications for how digital transformation programs are evaluated. Technology deployment indicators, such as the availability of electronic ticketing or cashless payment, do not reveal whether employees are genuinely prepared to use those systems independently. Readiness assessment should therefore accompany implementation and include behavioral indicators such as problem solving, adaptation to updates, consistency of use, and willingness to support colleagues. The partial mediation result further suggests that training should be layered: foundational literacy can be strengthened through information-evaluation and digital-safety modules, while competence should be developed through guided practice, simulations, supervised troubleshooting, and feedback on actual service tasks. This approach can help management identify employees who understand digital change but still require applied support. Although the present evidence comes from one terminal and one cross-sectional survey, the model offers a practical framework for similar transport organizations. Replication across terminals, modes of transport, and different levels of digital maturity would help determine whether the same literacy competence readiness pathway remains stable across organizational settings.

Table 3. Hypothesis Testing Results

Hypothesis	Path	β ; t; p	Decision
H1	Digital Literacy $\rightarrow$ Digital Readiness	0.740; 14.262; <0.001	Supported
H2	Digital Literacy $\rightarrow$ Digital Competence	0.711; 12.302; <0.001	Supported
H3	Digital Competence $\rightarrow$ Digital Readiness	0.485; 6.070; <0.001	Supported
H4	Literacy $\rightarrow$ Competence $\rightarrow$ Readiness	0.345; 4.931; <0.001	Supported
Mediation	Direct and indirect effects significant	Partial mediation	Confirmed

Conclusion and Recommendation

This study demonstrates that digital literacy is a significant driver of digital readiness among Tirtonadi Terminal employees and that digital competence provides an important partial mediation pathway. Digital literacy directly improves readiness ($\beta = 0.740$) and strongly builds digital competence ($\beta = 0.711$), while digital competence itself improves readiness ($\beta = 0.485$). The significant indirect effect ($\beta = 0.345$) confirms that readiness is strengthened when foundational literacy is converted into applied digital capability. The model explains 50.5% of digital competence and 66.4% of digital readiness, with satisfactory measurement quality and predictive relevance. For management, the results support a staged workforce-development strategy that combines digital-information literacy with practical training, independent problem solving, safe data handling, and repeated use of operational technologies. The study is limited by its cross-sectional design, single-site setting, and self-reported questionnaire data. Future research should use multi-site or longitudinal designs and examine organizational support, digital leadership, and training climate as additional determinants of employee readiness.

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