



Digital leadership and safety management: Maximizing safety performance through employee competence

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ABSTRACT

Purpose-This study examines the mediating role of employee competence in the relationship between digital leadership, safety management, and safety performance in hospitals in Surabaya, Indonesia. In the era of digital transformation, hospitals must enhance patient and staff safety through digitally competent leadership and structured safety management systems.

Methodology-A quantitative, multi-site cross-sectional design was applied in several hospitals in Surabaya, involving 161 healthcare workers who had worked for at least one year and were involved in safety-related decision-making. Data were collected via an online questionnaire using a 1–5 Likert scale and analyzed with SmartPLS 4.0.

Findings-The results show that safety management, digital leadership, and employee competence have positive and significant effects on safety performance, with employee competence mediating the impacts of digital leadership and safety management. These findings highlight safety management as a foundational capability, while digital leadership and employee competence act as complementary drivers of safety performance.

Research Limitations-This study is limited to healthcare workers from several hospitals in Surabaya using a cross-sectional design, so generalizations to other regions and causal inferences should be made with caution. Reliance on perceptual data may also introduce subjective bias.

Novelty-The study introduces and empirically tests the Digital–Safety–Competence Triad by integrating the Natural Resource-Based View and the Ability–Motivation–Opportunity framework in Indonesian hospitals, and offers practical guidance for hospital management to institutionalize digital safety monitoring, competence-based training, and systematic evaluation of safety performance.

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1. Introduction

Digital transformation in healthcare requires hospitals to adopt new technologies, such as electronic health records and digital incident reporting systems, to improve efficiency and patient safety (Stoumpos et al., 2023). In the Indonesian context, these technologies are increasingly embedded within hospital information systems to support patient safety incident reporting and compliance with national regulations. However, adopting these technologies does not automatically improve safety performance without competent leadership and an integrated safety management system (Haas & Cauda, 2022; Yap et al., 2024). From a strategic

perspective, safety management systems can be viewed as organizational capabilities that underpin safety performance, while digital leadership shapes how these capabilities are deployed in practice. Safety performance in hospitals encompasses efforts to prevent medical errors, control infections, and create a safe work environment for staff and patients, and achieving this performance requires strong leadership capabilities and a robust safety management system (Saleem & Malik, 2022; Enahoro et al., 2024).

Digital leadership has been identified as a key factor influencing technology adoption and safety culture (Sacavém et al., 2025). Digital leadership not only promotes the use of digital tools but also fosters transparency and communication that support patient safety (Shahzad, 2024). Research shows that digital leadership can improve staff compliance with procedures and encourage participation in incident reporting (Chen & Zhao, 2024). However, some studies have found that the impact of digital leadership on safety performance is not always direct; this impact is often mediated by other factors, such as employee competence (Mamdouh et al., 2025; Ulum & Wulansari, 2025). In line with the Ability–Motivation–Opportunity (AMO) framework, healthcare workers’ competencies, which encompass knowledge, skills, and the ability to identify hazards and respond to emergencies, are viewed as a critical mechanism that translates leadership and digital systems into concrete actions in the workplace (Rodríguez-Feria et al., 2022). Clinically and digitally competent employees are better able to use electronic health records and incident reporting platforms, comply with safety protocols, and contribute to continuous improvement.

In addition to digital leadership, safety management comprising policies, training, communication, and preventive planning also forms the foundation of a hospital’s safety system (Stroeve et al., 2022; Salim et al., 2023). A robust system helps organizations identify risks, train staff, and respond to emergencies, which in turn enhances safe behavior and performance (Stroeve et al., 2022; Zhang et al., 2022). Viewed through the Natural Resource-Based View (NBRV), such safety management capabilities represent strategic resources that can generate superior safety performance when they are valuable, rare, inimitable, and well-organized. However, previous research indicates that safety management does not necessarily improve performance if it is not balanced by continuous improvements in employee competencies (Kineber et al., 2023). Thus, employee competencies serve as a bridge connecting systems and leadership to tangible safety outcomes (Makki & Alidrisi, 2022), without competent staff, even well-designed safety policies and digital tools may fail to translate into safer practice.

Most studies still examine digital leadership, safety management, or employee competence separately. Research that integrates these three variables into a single model to explain safety performance in hospitals, particularly in Indonesia, remains very limited. This gap becomes even more relevant in Surabaya, the healthcare hub of East Java. In 2024, the East Java Health Department noted that throughout 2023, Dr. Soetomo General Hospital reported 234 patient safety incidents, with the most common categories being near-misses (65.5%) and adverse events (34.5%). Meanwhile, private hospitals in Surabaya also reported similar trends, with high rates of healthcare-associated infections and medication administration errors. These statistics illustrate that both public and private hospitals in Surabaya operate under high clinical pressure, complex case mixes, and increasing demands for digital documentation, creating a context in which digital leadership, safety management, and employee competence are likely to critically influence safety performance. The persistence of such incidents indicates a gap between formal commitments and actual implementation, making research on the internal factors influencing safety performance in Surabaya’s hospitals urgently needed.

Therefore, this study aims to examine the mediating role of healthcare employee competence in the relationship between digital leadership, safety management, and safety performance. Employee competence is conceptualized as the key mechanism through which organizational resources, digital leadership, and safety management systems are translated into improved safety outcomes, in line with the integration of the NBRV and the AMO framework. To address this objective, the study employs a multi-site design across hospitals in Surabaya. The multi-site approach was chosen to enhance the generalizability of the findings and capture

contextual variations among hospitals, including differences in ownership, scale, and digital maturity. This study is expected to make a theoretical contribution through the development of the Digital-Safety-Competence Triad and to provide practical recommendations for hospital leaders, regulators, and healthcare workers in efforts to improve patient and staff safety in the digital age.

2. Literature Review and Hypothesis Development

Grand Theory

This study uses two main theories as its foundation: the Natural Resource-Based View (NRBV) and the Ability-Motivation-Opportunity (AMO) theory. The NRBV, proposed by Hart (1995), was originally designed to explain competitive advantage through the development of environment-based resources; however, recent developments indicate that the NRBV can be extended to various domains of strategic management, including safety performance and patient safety (Nnabuife, 2024; Khan et al., 2026). In this study, the strategic resources are digital leadership and safety management, both internal assets that organizations can develop to achieve superior safety performance (Al-Dmour et al., 2026).

Nevertheless, NRBV has a limitation: it does not explain how these resources translate into concrete actions. Therefore, Appelbaum et al. (2000) AMO theory is used to address this limitation. AMO explains that individual and collective behavior is shaped by three elements: ability, motivation, and opportunity (Appelbaum et al., 2000; Ali et al., 2024). In this study, healthcare workers' competencies represent the ability element, digital leadership serves as a motivator, and safety management provides the structural opportunities for safe behavior to materialize (Chen & Zhao, 2024; Luo et al., 2025). Integrating NRBV and AMO enables a comprehensive understanding of how organizational resources translate into individual competencies and ultimately result in safety performance.

Digital Leadership

Digital leadership refers to a set of behaviors and competencies that enable leaders to drive the adoption of digital technologies, utilize digital tools in organizational management, and inspire subordinates to embrace digital innovation (Sağbaşı & Erdoğan, 2022; Qiao et al., 2024). In the context of hospital safety, digital leadership supports implementing digital incident reporting systems, using electronic health records for safety monitoring, and fostering a culture of transparency and communication that supports patient safety (Kiridjievska et al., 2024; Tsekouropoulos et al., 2025). Based on AMO theory, digital leadership functions as a motivational element that encourages healthcare workers to adopt safe behaviors and participate in safety initiatives (Appelbaum et al., 2000). Digitally competent leaders not only lead by example but also provide the resources and support needed to develop their subordinates' competencies (Malik et al., 2025).

Safety Management

Safety management is a systematic approach an organization uses to manage safety through policies, training, communication, and preventive planning (Saleem & Malik, 2022; Zhang et al., 2024). In the hospital context, safety management includes written patient safety policies, ongoing training programs, effective communication channels about risks, and emergency response plans and periodic simulations (Alsabri et al., 2022; Falade et al., 2024). Based on AMO theory, safety management provides the "opportunity" element for healthcare workers to behave safely through clear procedures, access to training, and systemic support (Appelbaum et al., 2000). From the NRBV perspective, safety management is a strategic resource that enables organizations to effectively identify, assess, and control risks (Hart, 1995; Blanco-Juárez & Buele, 2025). A robust safety management system can reduce incidents, improve compliance with procedures, and foster a sustainable safety culture, but its effectiveness depends heavily on how well the system translates into the workforce's actual competencies and behaviors (Qiao et al., 2022; Kang, 2024).

Employee Competence

Employee competence is defined as the totality of knowledge, skills, and behaviors that employees possess to perform their jobs safely and effectively (Daniali et al., 2022; Gao et al., 2023). Competence includes understanding operational procedures, identifying hazards, knowing risks and control measures, and responding to emergencies and using safety equipment (Rahman et al., 2022; Hosken & O’Sullivan, 2024). From the AMO perspective, competence is an element of ability that enables healthcare workers to act safely while performing their daily tasks (Appelbaum et al., 2000). Competent workers not only comply with existing procedures but also proactively identify potential hazards before incidents occur, directly contributing to the prevention of accidents and work errors (Aderamo et al., 2024; Nugraha et al., 2025).

Safety Performance

Safety performance refers to the extent to which an organization successfully manages workplace safety, as reflected in low rates of accidents, injuries, and adverse events (Ta et al., 2022; Rahim et al., 2023). In the hospital context, safety performance includes compliance with patient safety procedures, the use of personal protective equipment, participation in safety programs, and voluntary efforts to improve workplace safety (Mashi et al., 2023; He et al., 2024). Safety performance is the ultimate outcome of organizational resources, leadership motivation, individual capabilities, and systemic support (Saleem & Malik, 2022; Abeje & Luo, 2023).

Hypothesis Development

Digital Leadership and Safety Performance

Digital leadership in hospitals shapes how digital tools support safety-related behaviors and routines. As emphasized in the AMO framework, leadership practices that provide clear direction, support, and recognition can enhance employees’ motivation to engage in safe behavior, both in compliance with procedures and in voluntary participation in safety programs (Appelbaum et al., 2000; Demeke et al., 2025). In the digital context, leaders utilize technology to increase transparency, communication, and safety monitoring, which in turn strengthens compliance and safety awareness among healthcare workers (Alwazrah et al., 2025; Al-Dmour et al., 2026). Empirical studies show that digital leadership directly contributes to improved procedural adherence and fewer safety incidents (Chen & Zhao, 2024; Jiang et al., 2026) and fosters a culture of transparency and accountability that encourages incident reporting and organizational learning (Qiao et al., 2024; Chowdhury, 2025). Taken together, these findings suggest that digital leadership functions as a crucial driver of safety-related behaviors and outcomes in hospitals. **H₁: Digital Leadership Has a Positive Effect on Safety Performance.**

Safety Management and Safety Performance

Safety management, encompassing policies, training, communication, and preventive planning, provides the structural backbone of a hospital’s safety system. Within a strategic capability perspective, such systems can be regarded as organizational resources that enable hospitals to control risks and manage safety-critical processes effectively (Hart, 1995; Mungai & Mang’ana, 2025). From the AMO lens, safety management gives healthcare workers opportunities to act safely through clear procedures, standardized work instructions, and responsive reporting mechanisms (Appelbaum et al., 2000; Saleem & Malik, 2022). A robust safety management system helps organizations identify hazards, train staff, and respond to emergencies, thereby reducing incidents and enhancing safety performance (Negi et al., 2024; Xu et al., 2024). Prior studies consistently find that comprehensive safety management is associated with lower accident rates and higher levels of procedural compliance (Ajmal et al., 2022; Bai et al., 2023). These insights indicate that stronger safety management should translate into better safety outcomes. **H₂: Safety Management Has a Positive Effect on Safety Performance.**

Digital Leadership and Employee Competence

Digital leadership not only influences safety outcomes directly but also shapes the development of employee competences. When viewed as a strategic capability, digital leadership enables organizations to leverage technology for training, communication, and safety monitoring, thereby strengthening their human resources (Hart, 1995; Wang et al., 2024). Consistent with the AMO perspective, visionary and supportive leadership creates motivational conditions that encourage healthcare workers to acquire and refine safety-related skills (Appelbaum et al., 2000). Such leaders foster an environment that is conducive to continuous learning and competency enhancement (Senadjki et al., 2024; Mollah et al., 2025). Empirical evidence confirms that digital leadership positively influences employee competencies by providing digital resources, technology-based training, and a culture of ongoing development (Dewi et al., 2025; Lukman & Yune, 2025). In the hospital context, this implies that stronger digital leadership should increase healthcare workers' competence in identifying hazards, responding to emergencies, and adhering to safety procedures. **H₃: Digital Leadership Has a Positive Effect on Employee Competence.**

Safety Management and Employee Competence

Safety management also plays a central role in shaping healthcare workers' competence. As an organizational resource, safety management provides the structures, procedures, and training pathways that enable competency development (Hart, 1995; Rahman et al., 2022). From the AMO standpoint, it offers opportunities for staff to develop and demonstrate safety skills by granting access to training, clarifying responsibilities through procedures, and facilitating communication regarding safety issues (Appelbaum et al., 2000). Comprehensive safety management systems typically incorporate continuous training, simulations, and periodic feedback, all of which contribute to enhancing healthcare workers' competencies (Rahman et al., 2022; Falade et al., 2024). Empirical findings show that organizations with mature safety management systems tend to have a workforce that is more proficient in identifying risks, using safety equipment, and responding to emergencies (Kineber et al., 2023; Afzan et al., 2025). These observations suggest that stronger safety management is likely to be associated with higher levels of employee competence. **H₄: Safety Management Has a Positive Effect on Employee Competence.**

Employee Competence and Safety Performance

Employee competence is a key individual-level mechanism through which safety systems and leadership translate into performance. The AMO theory highlights the centrality of ability in shaping safety behavior: employees must possess the necessary knowledge and skills to act safely (Appelbaum et al., 2000; Liu et al., 2025). Competent healthcare workers can identify hazards, respond appropriately to emergencies, and comply with safety procedures, reducing the likelihood of incidents and work-related errors (Rahman et al., 2022; Abikenova et al., 2023). Empirical research indicates that employee competence strongly predicts procedural compliance, participation in safety programs, and lower accident rates (Bayram, 2022; Shekh & Sadiq, 2024). Competent workers do not merely follow rules; they also proactively contribute to improving the safety system by reporting incidents and suggesting corrective actions (Bai et al., 2023; Aderamo et al., 2024). Therefore, higher levels of employee competence should lead directly to better safety performance in hospitals. **H₅: Employee Competence Has a Positive Effect on Safety Performance.**

Digital Leadership and Safety Performance: The Mediating Role of Employee Competence

Integrating NRBV and AMO perspectives suggests that organizational resources, such as leadership and safety systems, influence performance through behavioral mechanisms rather than automatically (Hart, 1995; Appelbaum et al., 2000). Digital leadership provides direction, resources, and technology-based training, thereby encouraging the development of safety-related competencies among employees (Sağbaş & Erdoğan, 2022; Chen & Zhao, 2024;

Septiadi & Ramdani, 2024; Jiang et al., 2026). As competencies improve, healthcare workers are better equipped to engage in safe behavior, including procedural compliance and active participation in safety programs (Rahman et al., 2022; Shekh & Sadiq, 2024). Prior studies have shown that employee competence can mediate the influence of leadership on performance in both industrial and healthcare settings (Alhosani & Ahmad, 2024; Kumar et al., 2026). This implies that digital leadership may affect safety performance not only directly but also indirectly through its impact on employee competence. **H₆: Employee Competence Mediates the Relationship between Digital Leadership and Safety Performance.**

Safety Management and Safety Performance: The Mediating Role of Employee Competence

Safety management, as a strategic organizational resource, establishes the formal systems through which safety is organized but does not guarantee improved performance unless employees are competent to enact these systems (Hart, 1995; Alshammari et al., 2025). In AMO terms, safety management provides the opportunity element by offering clear procedures, access to training, and effective communication channels that enable staff to build and use safety competences (Appelbaum et al., 2000). Comprehensive safety management systems create an environment that supports continuous learning and competency improvement through routine training, simulations, and structured feedback (Aderamo et al., 2024; Yang & Fan, 2025). Once these competencies are established, employees are more likely to comply with procedures, identify hazards early, and respond appropriately to emergencies, which ultimately enhances safety performance (Rahman et al., 2022; Tang, 2025). Previous research indicates that competence mediates the influence of management systems on safety outcomes, because well-designed systems are effective only when supported by a capable workforce (Atikasari et al., 2022; Zhu et al., 2023). This suggests that safety management may impact safety performance both directly and indirectly through employee competence. **H₇: Employee Competence Mediates the Relationship between Safety Management and Safety Performance.**

Figure 1 presents a conceptual framework with digital leadership and safety management as predictors, safety performance as the outcome, and employee competence as the mediator. This model positions employee competence as the mediating variable that links digital leadership and safety management to safety performance.

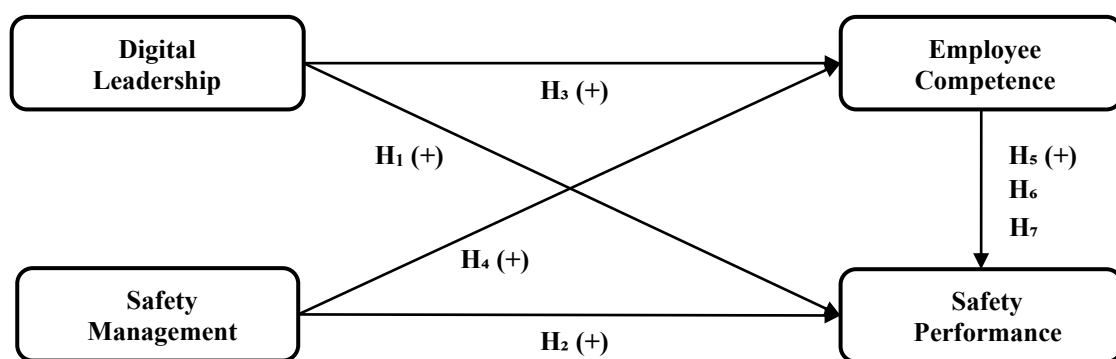


Figure 1. Conceptual Framework

3. Research Methodology

Surabaya was selected as the study location because it has a variety of hospital types that allow implementation of a multi-site design, adequate accessibility for researchers, and no previous studies testing this model in the region. Data were collected via an in-person questionnaire using a 1–5 Likert scale. All instruments were adapted from previous validated studies and are presented in Table 1. To reduce the potential for common method bias, respondents were assured of anonymity and confidentiality; the items for each construct were

grouped in separate sections; and the instructions emphasized that answers should reflect actual practices rather than desirable behaviors.

Table 1. Measurement Item

Construct	Operational definition	Item code	Measurement item	Source
Digital Leadership	The extent to which leaders use digital knowledge, tools, and strategic direction to guide digital transformation and support safety-related work practices.	DL1	My leader is always up to date when it comes to digital knowledge.	Zeike et al. (2019); Chen and Zhao (2024)
		DL2	My leader drives the digital transformation forward proactively in our unit.	
		DL3	My leader can make others enthusiastic about digital transformation.	
		DL4	My leader has a clear idea of the structures and processes needed for digital transformation.	
		DL5	My leader thinks using digital tools is enjoyable.	
		DL6	My leader is a digital expert.	
Safety Management	The formal system of safety policies, training, communication, and preventive planning designed to reduce risk and support safe working practices in hospitals.	SM1	Firm coordinates its health and safety policies with other HR policies to ensure commitment and well-being of workers.	Fernández-Muñiz et al. (2007)
		SM2	Written declaration is available to all workers reflecting management's concern for safety, principles of action and objectives to achieve.	
		SM3	Safety policy contains commitment to continual improvement, attempting to improve objectives already achieved.	
		SM4	Workers are given sufficient training provided when entering the firm, changing jobs, or using new techniques.	
		SM5	Training actions are continuous and periodic, integrated into a formally established training plan.	
		SM6	Instruction manuals or work procedures are elaborated in preventive action.	
		SM7	There is fluent communication embodied in periodic meetings, campaigns, or presentations to transmit safety principles and rules.	
		SM8	Information systems are made available to affected workers prior to modifications in production processes or job positions.	
		SM9	Prevention plans are formulated based on risk assessment in all job positions.	
		SM10	The firm has elaborated and implemented an emergency plan for serious risks or catastrophes.	
		SM11	Periodic simulations are carried out to check the efficacy of the emergency plan.	
Employee Competence	The knowledge and skills of healthcare workers to understand risks, follow safety procedures, and respond appropriately to emergencies.	EC1	I am familiar with the operation procedures and safety requirements related to my work.	Wang et al. (2021)
		EC2	I understand risks and relevant control measures within the work environment.	
		EC3	I am familiar with emergency procedures, responsibilities, and the use of emergency equipment.	
		EC4	I understand emergency response, escape procedures, and first-aid requirements.	
Safety Performance	The extent to which healthcare workers demonstrate safe behavior through compliance with safety procedures and active participation in safety improvement activities.	SP1	I use all the necessary safety equipment to do my job.	Griffin and Neal (2000); Neal and Griffin (2006)
		SP2	I use the correct safety procedures for carrying out my job.	
		SP3	I ensure the highest levels of safety when I carry out my job.	
		SP4	I promote the safety program within the organization.	
		SP5	I put in extra effort to improve workplace safety.	
		SP6	I voluntarily carry out activities that improve workplace safety.	

This study employed a quantitative approach with a multi-site cross-sectional design at hospitals in Surabaya. The study population consisted of healthcare workers, including doctors, nurses, pharmacists, and medical administrative staff, meeting the following criteria: (1) having worked for at least 1 year, (2) being directly involved in patient care or safety decision-making, and (3) having experience using incident reporting systems or digital tools in their work. A

purposive sampling technique was used to select respondents who met these inclusion criteria and were considered to have sufficient exposure to safety-related practices and digital systems in the hospital setting. This study recruited 161 respondents, with a target of approximately 30–40 respondents per hospital. This sample size reflects practical constraints in accessing healthcare workers who meet the criteria and can participate without disrupting patient care, given the high workload and limited time available to complete questionnaires in busy hospital environments. From an analytical perspective, the sample size exceeds the minimum requirement for partial least squares structural equation modeling (PLS-SEM) and is adequate for examining the relationships among the study variables, although it may limit the generalization of findings to the broader healthcare system.

The data were analyzed using SmartPLS 4.0. Convergent validity was assessed using outer loading (≥ 0.70) and average variance extracted (≥ 0.50) (Hair et al., 2021). Reliability was assessed using Cronbach's alpha and composite reliability (≥ 0.70) (Ghozali, 2021). Multicollinearity was assessed using the variance inflation factor (< 5.00) (Hair et al., 2021). Hypothesis testing was performed using bootstrapping with a p-value criterion (< 0.05) and a t-statistic (> 1.96) (Ghozali, 2021; Hair et al., 2021).

4. Result and Discussion

Table 2. Characteristics of Respondents

Classification	Description	Total	Percentage
Gender	Male	68	42.2
	Female	93	57.8
Age	< 25 years old	39	24.2
	25–35 years old	41	25.5
	36–45 years old	37	23
	< 46 years old	44	27.3
	Vocational High School for Health Sciences	19	11.8
Level of Education	Diploma in Nursing/Midwifery	29	18
	Bachelor's Degree in Nursing/Midwifery	67	41.6
	Physicians/Specialists	46	28.6
Length of Employment	1–5 years	31	19.3
	6–10 years	29	18
	11–15 years	58	36
	> 15 years	43	26.7
	General practitioner or specialist	34	21.1
Occupation	Nurses / Midwives	56	34.8
	Pharmacist / Pharmacy Staff	29	18
	Hospital Administration / Management Staff	42	26.1

Table 2 presents the demographic profile of the 161 respondents. The majority were women (57.8%), with a relatively even age distribution and the largest age group being those over 46 years old (27.3%). Most respondents had 11–15 years of work experience (36%), indicating that they were relatively experienced healthcare workers. By profession, the sample was dominated by nurses/midwives (34.8%) and administrative/management staff (26.1%), while physicians or specialists (21.1%) and pharmacists (18.0%) made up a smaller proportion. This composition reflects the structure of many hospital safety programs, where nurses and administrative staff are heavily involved in day-to-day implementation and documentation of safety procedures, whereas doctors and pharmacists tend to have more focused roles in clinical decision-making and medication safety. Consequently, this study's findings are likely to be more strongly influenced by nursing and administrative perspectives on safety and may not fully capture the dynamics of medical and pharmaceutical safety from the standpoint of physicians and pharmacists. Consider this limitation when interpreting the results.

Figure 2 shows the measurement model of the relationship between the indicators and the construct, while Table 3 summarizes the validity, reliability, and multicollinearity tests. All indicators have outer loadings > 0.70 (Hair et al., 2021), Cronbach's alpha and composite

reliability values >0.85 (Ghozali, 2021), and AVE >0.57 (Hair et al., 2021), thus meeting the criteria for validity and reliability. VIF values were below 5.00, indicating no multicollinearity issues (Hair et al., 2021). Overall, the model is suitable for proceeding to structural analysis.

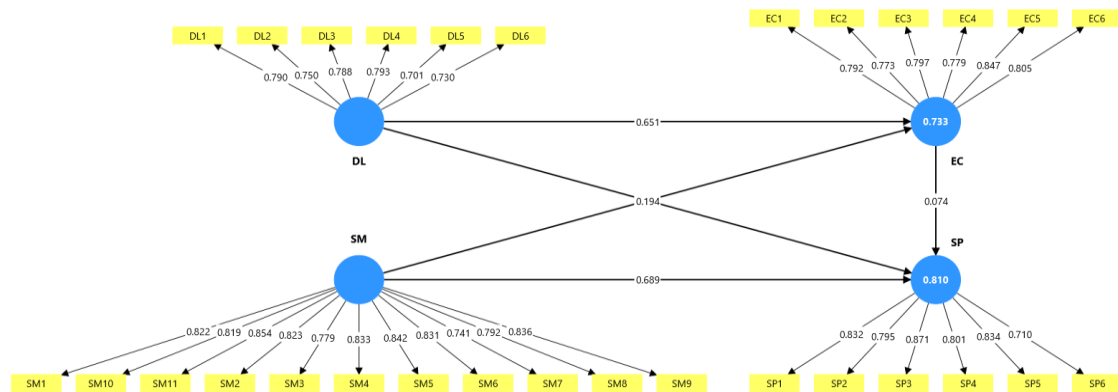


Figure 2. Measurement Model

Table 3. Validity, Reliability, and Variance Inflation Factor (VIF) Tests

Construct	Outer Loading	VIF	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Digital Leadership			0.853	0.891	0.577
DL1	0.790	1.998			
DL2	0.750	2.092			
DL3	0.788	2.269			
DL4	0.793	2.347			
DL5	0.701	1.779			
DL6	0.730	2.137			
Safety Management			0.950	0.956	0.666
SM1	0.822	2.611			
SM2	0.823	2.907			
SM3	0.779	2.620			
SM4	0.833	2.258			
SM5	0.842	2.306			
SM6	0.831	2.959			
SM7	0.741	2.024			
SM8	0.792	2.390			
SM9	0.836	2.636			
SM10	0.819	2.958			
SM11	0.854	2.950			
Employee Competence			0.887	0.914	0.639
EC 1	0.792	2.324			
EC2	0.773	2.027			
EC3	0.797	2.118			
EC4	0.779	1.937			
EC5	0.847	2.487			
EC6	0.805	2.327			
Safety Performance			0.893	0.929	0.654
SP1	0.832	2.301			
SP2	0.795	2.087			
SP3	0.871	2.790			
SP4	0.801	2.059			
SP5	0.834	2.396			
SP6	0.710	1.684			

Table 4 presents the results of hypothesis testing using the bootstrapping procedure, in which a hypothesis is accepted if it meets the criteria of a p-value < 0.05 and a t-statistic > 1.96 (Ghozali, 2021). Based on the test results, all hypotheses in this study were accepted.

Table 4. Hypothesis Test Results

Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistic (O/STDEV)	P-Values
Digital Leadership → Safety Performance	0.242	0.229	0.069	3.504	0.000
Safety Management → Safety Performance	0.708	0.706	0.048	14.747	0.000
Digital Leadership → Employee Competence	0.651	0.644	0.059	11.121	0.000
Safety Management → Employee Competence	0.256	0.244	0.070	3.649	0.000
Employee Competence → Safety Performance	0.074	0.064	0.080	2.926	0.035
Digital Leadership → Employee Competence → Safety Performance	0.048	0.042	0.052	2.928	0.033
Safety Management → Employee Competence → Safety Performance	0.019	0.016	0.020	2.935	0.035

Discussion

Digital Leadership and Safety Performance

This study found that digital leadership has a positive and significant effect on safety performance. This indicates that digitally competent leaders can promote increased compliance with safety procedures, use of personal protective equipment, and staff participation in safety programs. In line with the AMO framework, digital leadership functions as a motivational driver that shapes healthcare workers' willingness and readiness to adopt safe behaviors by providing direction, feedback, and recognition (Appelbaum et al., 2000). Empirical evidence from Igwe-Nmaju and Anadozie (2024) and Alwazrah et al. (2025) similarly shows that digital leadership contributes to better procedural compliance and fewer incidents by using digital tools that enhance transparency, communication, and safety monitoring. In Surabaya, hospitals that have implemented digital incident reporting systems under strong digital leadership have reported more accurate reporting and faster responses to adverse events, which in turn help reduce incident rates. Together, these findings suggest that digital leadership operates as a strategic capability that enables hospitals to convert digital investments into tangible safety performance improvements, rather than technology alone producing such effects.

Safety Management and Safety Performance

Research findings indicate that safety management has a positive and significant impact on safety performance. This suggests that a comprehensive safety management system is the most dominant key factor in determining safety success in hospitals. From the NRBV perspective, safety management systems can be regarded as strategic organizational resources that provide hospitals with structured routines and procedures to control clinical risks and maintain patient and staff safety (Hart, 1995; Mungai & Mang'ana, 2025). From an AMO viewpoint, safety management offers healthcare workers opportunities to enact safe behavior by supplying clear policies, standard operating procedures, and accessible reporting systems (Appelbaum et al., 2000). These results are consistent with the findings of Ajmal et al. (2022), Kineber et al. (2023), and Shekh and Sadiq (2024), which confirm that comprehensive safety management is associated with lower accident rates and higher procedural compliance. In hospitals in Surabaya, the presence of well-established safety management, such as standardized patient safety policies, routine safety audits, and periodic emergency response

simulations, has become the cornerstone for fostering a strong safety culture and underpins the observed improvements in safety performance.

Digital Leadership and Employee Competence

The research findings show that digital leadership has a positive and significant effect on employee competencies. These results indicate that hospital leaders with digital capabilities can drive technology adoption, use digital tools for training and communication, and inspire staff to innovate in practical ways, thereby enhancing healthcare workers' knowledge, skills, and abilities in performing safety-related tasks. Within the AMO framework, digital leadership shapes the motivational climate and provides learning opportunities that encourage healthcare workers to develop safety competencies (Appelbaum et al., 2000). Visionary and supportive digital leadership creates an environment conducive to continuous learning and competency enhancement (Sacavém et al., 2025). These findings are also supported by Dewi et al. (2025) and Lukman and Yune (2025), who found that digital leadership positively influences employee competencies by providing digital resources, technology-based training, and a culture of continuous learning. In the context of hospitals in Surabaya, these results suggest that hospital management-led digital transformation, through the implementation of electronic medical records and digital incident reporting systems, has strengthened healthcare workers' capacity to perform safety-related duties, particularly in documenting incidents and responding to safety alerts.

Safety Management and Employee Competence

The research results also show that safety management has a positive and significant effect on employee competence. This means that a robust safety management system, including written policies, ongoing training, risk communication, and preventive planning, substantially enhances healthcare workers' competence. Consistent with NRBV, these systems can be interpreted as organizational resources that provide a structured environment for capability development (Hart, 1995). From the AMO perspective, safety management creates opportunities for staff to build and demonstrate safety skills through access to training, clear procedures, and effective communication channels (Appelbaum et al., 2000). These findings align with Rahman et al. (2022) and Xu et al. (2024), who show that comprehensive safety management systems enhance workers' competencies through routine training, simulations, and periodic feedback. At hospitals in Surabaya, implementing Hospital Accreditation Standards and regular patient safety training programs has improved healthcare workers' readiness to identify risks and respond to emergencies, illustrating how structured safety management translates into higher competence.

Employee Competence and Safety Performance

Research findings indicate that employee competence has a positive and significant effect on safety performance. These findings demonstrate that healthcare workers with high competence in procedural knowledge, hazard identification, and emergency response skills significantly improve compliance with safety procedures and participation in safety programs. This supports the AMO theory, which positions ability as a core determinant of safe behavior (Appelbaum et al., 2000). Studies by Ajmal et al. (2022) and Bayram (2022) similarly show that employee competence strongly predicts procedural compliance and reduced accident rates. The present study therefore reinforces the view that competence is a crucial individual-level mechanism through which organizational efforts are translated into safety outcomes. Although the effect size of competence may be smaller than that of safety management, competence remains an essential factor that hospitals must strengthen through sustained training and professional development to consolidate improvements in safety performance.

Employee Competence Mediates the Relationship between Digital Leadership and Safety Performance

This study found that employee competence mediates the effect of digital leadership on safety performance. These results indicate that digital leadership not only directly improves safety performance but also indirectly does so by enhancing healthcare workers' competence. The mediating role of competence supports the integrated NRBV–AMO perspective, in which digital leadership is viewed as a strategic resource that shapes both organizational conditions and individual abilities needed to achieve performance (Hart, 1995; Appelbaum et al., 2000). Digital leadership provides vision, resources, and technology-based training that strengthen employees' safety-related capabilities, which are then expressed as safe behaviors and higher safety performance. These findings align with the research by Ausat et al. (2024) and Chen and Zhao (2024), which confirm that competence mediates the influence of leadership on performance outcomes. In practical terms in Surabaya, this means that hospital leaders who actively promote digitalization not only create a safety-oriented climate but also build staff capacity through digital training and coaching, generating a multiplier effect on safety performance.

Employee Competence Mediates the Relationship between Safety Management and Safety Performance

The research results also indicate that employee competence mediates the effect of safety management on safety performance. This implies that safety management systems not only directly improve performance but also do so by enhancing healthcare workers' competence. From an integrated NRBV–AMO standpoint, safety management acts as a strategic resource and as an opportunity structure that enables healthcare workers to develop and apply their competencies through training, procedures, and effective communication (Rahman et al., 2022; Gayathri et al., 2025). The resulting competence then serves as the behavioral foundation for safe practices that improve safety performance (Makki & Alidrisi, 2022). Research by Kineber et al. (2023) and Bautista-Bernal et al. (2024) likewise finds that well-designed safety management systems only achieve their full impact when supported by a competent workforce. In hospitals in Surabaya, this underscores that sound safety policies and procedures must be accompanied by systematic staff training and development programs to ensure that the potential of safety management is realized in day-to-day clinical practice.

5. Conclusion

This study examined the mediating role of employee competence in the relationships between digital leadership, safety management, and safety performance in several hospitals in Surabaya. Using cross-sectional survey data from 161 healthcare workers, the results show that safety management, digital leadership, and employee competence are all positively associated with safety performance, and that employee competence mediates the relationships between digital leadership and safety performance and between safety management and safety performance. Safety management emerged as the strongest factor linked to safety performance, underscoring the central role of structured systems, including policies, training, communication, and preventive planning, in supporting patient and staff safety. The study advances the Digital–Safety–Competence Triad by integrating the Natural Resource-Based View and the Ability–Motivation–Opportunity framework in the context of Indonesian hospitals.

Theoretically, these findings suggest that digital leadership and safety management operate as complementary organizational capabilities whose influence on safety performance is channeled through employee competence. This highlights that structural resources and leadership must be internalized as individual abilities to yield safety outcomes. Practically, the results indicate that hospital management should strengthen safety management systems, develop digital leadership, and build healthcare workers' competencies in a coordinated manner. Examples include regular competence-based safety training, support for the use of electronic medical records and digital incident reporting systems, and programs that foster

interprofessional collaboration. The findings also provide preliminary input for hospital-level quality and safety initiatives, such as considering indicators on leaders' use of digital safety dashboards, routine training on incident reporting platforms, and explicit managerial support for staff participation in digital safety reviews.

This study has several limitations. The use of cross-sectional self-report data precludes strong causal inferences and allows for potential reverse causality, such as safety performance influencing the development of employee competence. Measuring all variables with a single questionnaire from the same respondents may introduce common method bias and subjective assessment, despite mitigation efforts. In addition, the sample was restricted to 161 healthcare workers in Surabaya hospitals, dominated by nurses and administrative staff with fewer physicians and pharmacists, which limits generalizability to other regions, hospital types, and professional groups.

Future research should employ longitudinal or multi-wave designs and incorporate objective safety indicators, such as incident statistics or audit results, to better clarify the direction of the relationships among digital leadership, safety management, employee competence, and safety performance. Larger, more diverse samples, using stratified or quota sampling, are needed to better represent physicians and pharmacists and to extend the analysis beyond Surabaya. Further studies could also include variables such as safety culture, interprofessional collaboration, or psychological safety and conduct comparative research across public and private hospitals or different regions to refine and test the Digital–Safety–Competence Triad in varied contexts.

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