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Nurses' Competence and Operational Performance: Mediating Effects of Process Effectiveness and Service Reliability

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Abstract:

This study aims to analyze the effect of competence on nurses' operational performance, with process effectiveness and service reliability as mediating variables at Andi Makkasau Regional General Hospital, Parepare City. The research employed a quantitative design using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The population consisted of 380 nurses, and 195 respondents were selected using the Slovin formula. Data were collected through structured questionnaires measuring competence, process effectiveness, service reliability, and operational performance. The results indicate that competence has a positive and significant effect on process effectiveness, service reliability, and nurses' operational performance. Furthermore, both process effectiveness and service reliability significantly improve operational performance. Mediation testing shows that competence indirectly enhances operational performance through improving work process effectiveness and service reliability. These findings suggest that strengthening professional competence contributes not only directly to performance but also indirectly through better work systems and more dependable healthcare services. The study implies that hospital management should prioritize competency-based training, workflow optimization, and service standardization to improve service quality. Future research is recommended to explore additional organizational or psychological factors influencing healthcare performance in broader institutional contexts.

Keywords: Competence; Process Effectiveness; Service Reliability; Nurse Operational Performan

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INTRODUCTION

Healthcare is a highly complex form of public service, directly related to the safety, well-being, and quality of life of the community. As healthcare organizations, hospitals are required to provide effective, efficient, and quality-oriented services. Within the hospital service system, operational performance is a key indicator in assessing the success of achieving organizational goals, particularly in ensuring that service processes meet established standards (Gu & Itoh, 2016).

Hospitals are not only required to provide quality healthcare services, but also to optimally manage resources to ensure consistent and sustainable service delivery. Good operational performance reflects a hospital's ability to manage service operations in a timely, accurate, and efficient manner, directly impacting the quality of healthcare services and patient satisfaction (Yu et al., 2023).

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In the hospital service system, nurses constitute the largest number of healthcare workers and have the highest level of interaction with patients. The strategic role of nurses makes their operational performance a key factor in determining the overall quality of hospital services. International research shows that the quality of nurse performance is closely related to patient safety, mortality rates, and patient satisfaction with healthcare services (Abrahamson et al., 2016). According to Edvardsson et al. (2017)operational performance, nurses describe the nurse's ability to carry out nursing tasks effectively, on time, and in accordance with standard operating procedures. This performance is not only seen from the quantity of work, but also from the quality of the service process, the accuracy of actions, and the consistency of services provided to patients.

One of the main factors influencing nurses' operational performance is competence. Competence is understood as a combination of knowledge, skills, and professional attitudes that enable individuals to perform their jobs effectively (Lin et al., 2024). In the nursing context, competence includes clinical skills, communication, decision-making, and adherence to professional ethics (Memarian et al., 2007).

Other studies also confirm that nurse competency influences job satisfaction and intention to retain their jobs, where good nursing manager competency supports nurse job satisfaction and reduces intention to leave the job, which ultimately contributes to the stability of the nursing workforce and the quality of service. (Mirzaei et al., 2024).Competency development is a crucial aspect in hospital human resource (HR) management because the competency of healthcare workers plays a significant role in improving the quality of service and patient satisfaction. A framework for HR management in healthcare environments emphasizes that workforce competency development is a key skill required for healthcare institutions to be able to provide high-quality care to patients (Ramadevi et al., 2016).

Process effectiveness in a hospital's operational system reflects the extent to which work procedures, service flows, and inter-unit coordination are aligned with objectives, which in turn impacts service quality and operational efficiency. Studies in various hospitals have shown that improving work process effectiveness can significantly reduce patient waiting times, optimize nurse productivity, and reduce medical errors (Lee et al., 2015).

The reliability of hospital services, which includes the ability to provide services consistently, timely, accurately, and according to standards, is a crucial dimension that influences patient satisfaction and trust. Studies show that good hospital service quality is positively related to patient satisfaction and their trust in healthcare providers (Alrubaiee & Alkaa'ida, 2011).

The reliability of nursing services is closely linked to nurse competence, which encompasses the integration of knowledge, skills, and attitudes that support quality and patient safety. Nurses with high clinical competence are able to provide appropriate, consistent, and responsive services to patient needs in a professional manner. Studies show that nurses' competency levels are reported as good to excellent, with the highest ability in managing clinical situations and the lowest ability in ensuring quality, indicating the need to focus on continuously improving service quality (Cruz, 2017).

Operational process effectiveness encompasses how tasks and procedures are carried out smoothly and efficiently, thus supporting the maximum utilization of nurse competencies. Similarly, service reliability reflects the consistency and quality of care provided by nurses and the overall health system, which is the result of the integration of competencies and well-executed processes. Without effective processes and reliable services,

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nurse competencies are vulnerable to not being fully realized in achieving good operational performance, for example in terms of patient safety, case management, and responsiveness to patient needs (Vogelgesang et al., 2020).

Andi Makassau Regional Hospital, Parepare City, as one of the referral hospitals in Parepare City, is faced with the demand to improve the quality of healthcare services in line with the increasing needs and expectations of the community. The dynamics of the healthcare environment require hospitals to continuously improve operational performance through professional and competent human resource management. In practice, Andi Makassau Regional Hospital, Parepare City, still faces various operational challenges, such as the complexity of service flows, demands for speed of service, and the need for consistent quality of nursing services. These conditions require nurses who are not only individually competent but also able to work within an effective process system and provide reliable services.

Based on this description, research on the influence of competency on nurses' operational performance through the mediation of process effectiveness and service reliability at Andi Makkasau Regional General Hospital, Parepare City, is relevant and strategic to conduct. The results of this study are expected to provide theoretical contributions to the development of operational management science as well as practical contributions for hospitals in formulating policies to improve nurse performance and the quality of health services .

H 1 : The Relationship between Nurse Competence and Operational Performance

Nursing competency is a key factor determining the quality of nursing care and directly contributing to improved nurses' operational performance. This competency encompasses clinical knowledge, technical skills, communication skills, professional attitudes, and decision-making and problem-solving abilities, enabling nurses to carry out their responsibilities appropriately, quickly, and accurately in accordance with healthcare standards (Fukada, 2018; Zhang et al., 2001).

H 2 : The Relationship between Competence and Process Effectiveness

The effectiveness of the nursing care process is greatly influenced by nurse competence, which encompasses the integration of knowledge, skills, and professional attitudes. Nurse competence plays a crucial role in ensuring that each stage of care is carried out in accordance with established procedures and objectives, ensuring that nursing care can be carried out correctly and consistently (Önal & Seren İntepeler, 2024).

H 3 : The Relationship between Competence and Service Reliability

The reliability of healthcare services is greatly influenced by the competency of nurses, which is the primary foundation. Nurse competency encompasses the integration of knowledge, skills, and attitudes that enable them to provide nursing care accurately, consistently, and in accordance with professional standards (Rahmah et al., 2022).

H 4 : The Relationship between Process Effectiveness and Nurse Operational Performance

Effective work processes have a significant positive impact on nurses' operational performance. Structured and efficient work processes enable nurses to perform their duties more smoothly, which directly reduces unnecessary workload and increases overall productivity (Ilangakoon et al., 2022).

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H 5 : The Relationship between Service Reliability and Nurse Operational Performance

Service reliability has a significant direct contribution to improving nurses' operational performance and patient satisfaction. Studies show that service reliability is the dimension of service quality that most influences patient satisfaction in the healthcare context (Al-Damen, 2017). Reliable service creates a more stable and predictable work environment, allowing nurses to work with greater peace of mind and direction, and maintaining sustainable work quality .

H 6 : The Relationship between Nurse Competence and Operational Performance through Process Effectiveness

Nurse competence significantly impacts operational performance through its mediating effect on the effectiveness of the nursing service process. Competence, encompassing the knowledge, skills, abilities, and behaviors nurses possess to perform their duties appropriately and skillfully, is a crucial foundation for delivering quality services in healthcare settings (Whelan, 2006).

H 7 : The Relationship between Nurse Competence and Operational Performance through Service Reliability

Service reliability as a mediator indicates that nurse competence does not directly impact operational performance, but rather, this influence occurs through increased service reliability. In other words, good nursing competence can only contribute optimally to actual performance and patient satisfaction if accompanied by reliable service standards. Studies show that nursing competence encompasses skills in judgment, communication, and critical thinking, which are crucial for providing safe and appropriate care to patients (Liou et al., 2020).

RESEARCH DESIGN AND METHODOLOGY

This study examines the role of nurses' competence in improving operational performance, both directly and indirectly through enhanced work process effectiveness and service reliability. A quantitative approach was employed using the Structural Equation Modeling–Partial Least Squares (SEM-PLS) technique to analyze the direct and mediating relationships among the variables in the proposed research model.

The population consisted of all 380 nurses working at Andi Makkasau Regional General Hospital, Parepare City. The sample size was determined using the Slovin formula, resulting in 195 nurses selected as respondents. Data were collected through a structured questionnaire using a five-point Likert scale. The instrument was developed based on indicators of competence, process effectiveness, service reliability, and nurses' operational performance.

The collected data were analyzed by testing the validity and reliability of the measurement instrument, followed by evaluation of the measurement model (outer model) and structural model (inner model) within the SEM-PLS framework to assess the relationships among variables.

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RESULTS AND DISCUSSION

the outer model evaluation in this study, all constructs used, namely Competence, Process Effectiveness, Service Reliability, and Nurse Operational Performance, have met the *validity* and *reliability criteria* required in *the Structural Equation Modeling–Partial Least Squares* (*SEM-PLS*) analysis. This indicates that all indicators used in the questionnaire are able to measure the research constructs accurately and consistently.

Table 1 . Evaluation of the Reflective Measurement Model (*Outer Model)* SEM-PLS

Variables	Measurement Items	*Outer Loading*	*Cronbach's Alpha*	*Composite Reliability*	*AVE*
Competence	X1	0.892	0.931	0.947	0.783
	X2	0.878			
	X3	0.883			
	X4	0.907			
	X5	0.862			
Process Effectiveness	Z1_1	0.926	0.950	0.962	0.835
	Z1_2	0.910			
	Z1_3	0.914			
	Z1_4	0.914			
	Z1_5	0.903			
Service Reliability	Z2_1	0.919	0.954	0.965	0.846
	Z2_2	0.917			
	Z2_3	0.925			
	Z2_4	0.931			
	Z2_5	0.907			
Nurse Operational Performance	Y1	0.918	0.957	0.967	0.854
	Y2	0.927			
	Y3	0.924			
	Y4	0.917			
	Y5	0.934			

In the Competence variable, *the outer loading values* of all indicators are in the range of 0.862–0.907, all of which have exceeded the minimum limit of 0.70. This condition indicates that each indicator has a strong correlation with the competency construct being measured. *The Cronbach's Alpha value* of 0.931 and *Composite Reliability* of 0.947 indicate a very high level of internal consistency. In addition, the *Average Variance Extracted* (*AVE*) value of 0.783 indicates that the competency variable is able to explain more than 78% of the indicator's variance, so that *convergent validity* can be declared very good.

The Process Effectiveness variable also showed very strong measurement results, with indicator *outer loading values* ranging from 0.903–0.926. All indicators met the *convergent validity criteria* because they had values above 0.70. *The Cronbach's Alpha value* of 0.950 and *Composite Reliability* of 0.962 confirmed that the indicators in this variable had a very high level *of reliability* . *The AVE value* of 0.835 indicated that most of the indicator variance was successfully explained by the process effectiveness construct, thus this construct was

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declared valid and reliable.

In the Service Reliability variable, all indicators also have very high *outer loading values* , ranging from 0.907 to 0.931. This indicates that each indicator strongly represents the service reliability construct. *A Cronbach's Alpha value* of 0.954 and *a Composite Reliability* value of 0.965 indicate excellent *internal consistency* . *Meanwhile, an AVE value* of 0.846 indicates that more than 84% of the indicator variance can be explained by the service reliability construct, thus meeting *convergent validity* very well.

Furthermore, the Nurse Operational Performance variable shows an *outer loading* indicator value in the range of 0.917–0.934, indicating a very strong relationship between the indicator and the measured construct. *The Cronbach's Alpha value* of 0.957 and *Composite Reliability* of 0.967 reflect a very high level of internal consistency. The *AVE value* of 0.854 indicates that the nurse operational performance construct is able to explain more than 85% of the indicator's variance, thus this construct is declared highly valid and reliable.

Hair et al. (2019)states that a construct in *SEM-PLS analysis* can be said to have good measurement quality if the *outer loading* indicator value is above 0.70, *the Composite Reliability* and *Cronbach's Alpha values* exceed 0.70, and *the Average Variance Extracted* (*AVE*) value is greater than 0.50. The results of *the outer model evaluation* in this study can be stated to meet the *SEM-PLS methodological standards* , so that *the measurement model* is suitable for use in testing structural relationships and further hypothesis testing.

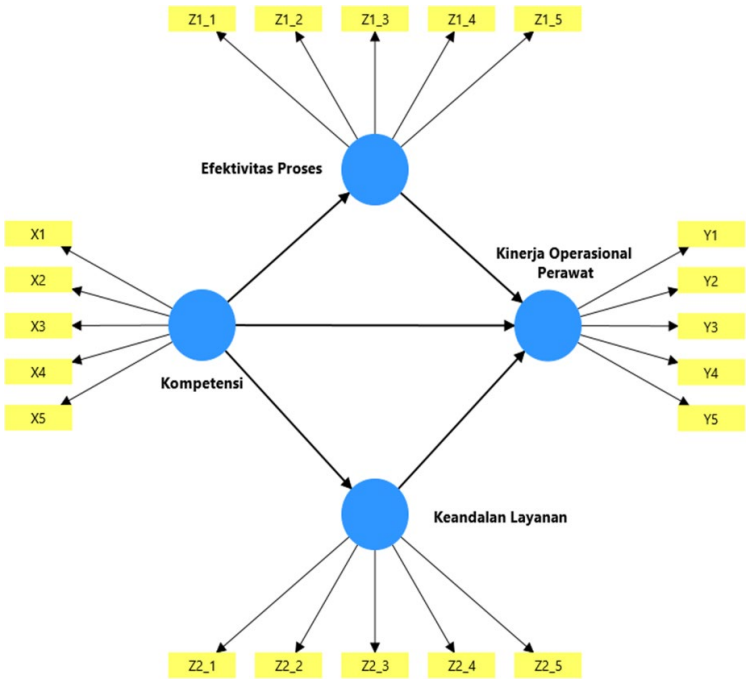

Figure 1. SEM-PLS measurement model

Table 2: Results of Structural Model Hypothesis Testing (*Inner Model*) SEM-PLS

NO	HYPOTHESIS	PATH COEFFICIENT (O)	T-STATISTICS	P-VALUE	RESULTS
H1	Competence has a positive and significant effect on	0.210	2,781	0.006	Hypothesis Accepted

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	Nurse Operational Performance				
H2	Competence has a positive and significant effect on Process Effectiveness	0.769	26,792	0,000	Hypothesis Accepted
H3	Competence has a positive and significant effect on Service Reliability	0.721	25,079	0,000	Hypothesis Accepted
H4	Process Effectiveness has a positive and significant effect on Nurse Operational Performance	0.392	5,630	0,000	Hypothesis Accepted
H5	Reliability of production services has a positive and significant effect on nurses' operational performance.	0.286	4,179	0,000	Hypothesis Accepted
H6	Competence has a positive and significant effect on Nurse Operational Performance through Process Effectiveness	0.302	5,473	0,000	Hypothesis Accepted
H7	Competence has a positive and significant effect on Nurse Operational Performance through Service Reliability	0.206	3,851	0,000	Hypothesis Accepted

Based on the results of hypothesis testing on the structural model (*inner model*) using *the Structural Equation Modeling–Partial Least Squares* (*SEM-PLS*) approach, all hypotheses proposed in this study were accepted. This indicates that the relationship between variables in the research model is statistically significant and in line with the hypothesized direction of influence.

The results of the first hypothesis test (*H1*) show that Competence has a positive and significant effect on Nurse Operational Performance, with a *path coefficient value* of 0.210, a *t-statistics value* of 2.781, and *a p-value* of 0.006. This value has exceeded the minimum required significance limit (*t-statistics* > 1.96 and *p-value* < 0.05), so it can be concluded that increasing nurse competence directly contributes to increasing nurse operational performance.

Furthermore, the results of the *H2 test* show that Competence has a positive and significant effect on Process Effectiveness, with a *path coefficient value* of 0.769, *t-statistics* of 26.792, and *a p-value* of 0.000. This high path coefficient value indicates that competence has a very strong role in increasing the effectiveness of work processes, where the higher the level of nurse competence, the more effective the operational processes carried out.

H3 test also show that Competence has a positive and significant effect on Service Reliability, with a *path coefficient value* of 0.721, *t-statistics* of 25.079, and *a p-value* of 0.000. These findings indicate that nurse competence is an important factor in ensuring service reliability, especially in providing consistent, accurate, and trustworthy services to patients.

In the *H4 test* , Process Effectiveness was proven to have a positive and significant effect

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on Nurse Operational Performance, with a *path coefficient value* of 0.392, *t-statistics* of 5.630, and *a p-value* of 0.000. These results indicate that the more effective the work process is, the higher the nurse's operational performance will be, both in terms of timeliness, service quality, and efficiency of task implementation.

H5 test show that Service Reliability has a positive and significant effect on Nurse Operational Performance, with a *path coefficient value* of 0.286, *t-statistics* of 4.179, and *a p-value* of 0.000. These findings indicate that good service reliability, such as service consistency and minimal errors in medical procedures, significantly contribute to improving nurse operational performance.

Furthermore, the results of the indirect effect test on *H6* show that Competence has a positive and significant effect on Nurse Operational Performance through Process Effectiveness, with a *path coefficient value* of 0.302, *t-statistics* of 5.473, and *a p-value* of 0.000. These results prove that process effectiveness acts as a significant mediating variable, where increasing nurse competence is able to improve operational performance indirectly through increasing work process effectiveness.

Similarly, in the *H7 test* , Competence was proven to have a positive and significant effect on Nurse Operational Performance through Service Reliability, with a *path coefficient value* of 0.206, *t-statistics* of 3.851, and *p-value* of 0.000. This finding indicates that service reliability also functions as a significant mediating variable, so that nurse competence not only has a direct impact on operational performance, but also has an indirect impact through increasing service reliability.

Overall, the results of *the inner model testing* indicate that competency has a significant direct and indirect influence on nurses' operational performance. Process effectiveness and service reliability were shown to act as mediating variables that strengthen this relationship. Thus, the structural model in this study is deemed robust and feasible, and is able to explain the mechanisms by which nurse competency can improve operational performance through improved work processes and service reliability.

1. The Role of Competence in Nurses' Operational Performance

Extensive research indicates that nurse competency has a positive and significant impact on their operational performance in healthcare. Nurses with good knowledge, skills, and work attitudes are better able to carry out nursing tasks effectively, on time, and in accordance with established operational standards. This competency enables them to make clinical decisions quickly and accurately, while managing their work time efficiently, thereby increasing productivity and the quality of patient care (Önal & Seren İntepeler, 2024).

2. The Role of Competence in Process Effectiveness

The test results show that competency has a positive and significant effect on process effectiveness at Andi Makkasau Regional Hospital in Parepare City. Nurse competency, which is an integration of knowledge, skills, and attitudes, is a key factor in creating effective and efficient work processes and improving the quality of nursing services (Rahmah et al., 2022).

3. The Role of Competence in Service Reliability

Research shows that nurse competence has a positive and significant impact on the reliability of healthcare services, which includes the consistency, precision, and accuracy of services provided to patients. Nurse competence is an integration of knowledge, skills, and attitudes

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that need to be maintained through continuing education to improve the quality of nursing services and reduce the risk of errors in patient care (Rahmah et al., 2022).

4. The Role of Process Effectiveness on Nurse Operational Performance

Research shows that process effectiveness has a positive and significant impact on nurses' operational performance. Well-structured, clear, and efficient work processes enable nurses to perform their duties optimally through a more systematic workflow, thereby reducing wasted time and energy and improving coordination between work units (Jones & Linderman, 2014).

5. The Role of Service Reliability on Nurse Operational Performance

Research shows that service reliability has a positive and significant impact on nurses' operational performance. Consistent, accurate, and reliable service reliability encourages nurses to perform optimally because it reflects their ability to deliver services according to promises and established standards. When services operate reliably, patient trust increases and the burden of correcting service errors can be minimized, ultimately improving nurses' operational performance . Riman et al. (2023)supports this finding by showing that operational failures *that* hinder the availability and access to reliable information, services, and equipment negatively impact the quality of care, patient satisfaction, and nurse outcomes such as *burnout* and job satisfaction.

6. The Role of Competence on Nurses' Operational Performance through Process Effectiveness

The indirect effect test shows that nurse competence has a positive and significant impact on operational performance through the mediation of work process effectiveness. This means that process effectiveness acts as a mediating variable that strengthens the relationship between nurse competence and operational performance. Nurse competence encourages the formation of more effective work processes, which then contributes to improved operational performance. In other words, nurse competence not only improves performance directly, but also through increasing work process effectiveness. Hu et al. (2021)shows that nurse competence is an important factor in driving their overall work performance through the mediation of other variables related to work processes and engagement. For example, higher nurse competence increases the effectiveness of task and work process implementation, which ultimately impacts improved performance and more optimal work results.

7. The Role of Competence on Nurses' Operational Performance through Service Reliability

Research has shown that nurse competence has a positive and significant impact on operational performance through service reliability. Nurses with adequate competence are able to provide reliable, consistent, and error-free services, thereby directly improving their operational performance. In addition to this direct influence, service reliability acts as a mediating variable that strengthens the relationship between nurse competence and operational performance. This means that competence not only directly impacts operational performance but also through improving the quality and consistency of the services provided by nurses. In other words, competence increases service reliability, which in turn drives improvements in nurse operational performance (Önal & Seren İntepeler, 2024; Riman et al., 2023).

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CONCLUSION

Based on the discussion results, it can be concluded that nurse competence is a key factor in improving nurse operational performance, both directly and indirectly. Competence has been shown to have a positive and significant effect on operational performance, process effectiveness, and service reliability. In addition, process effectiveness and service reliability act as significant mediating variables, explaining how nurse competence translates into more optimal operational performance. Nurses with high competence are able to create more effective work processes and provide more reliable services, thus impacting the continuous improvement of service quality and operational performance. These findings emphasize the importance of developing nurse competence as a primary strategy in improving work process effectiveness, service reliability, and operational performance at Andi Makkasau Regional General Hospital, Parepare City .

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