The Moderating Role of Supervisor Support in the Mediating Effect of Career Satisfaction on High Performance Work Systems: A Path to Enhanced Nurse Service Quality

Chusni Mubarakh[1], Fitri Kartika[2], Yani Restiani Widjaja[3], Wisnu Prajogo[4]

[1]Department of Management, ARS University, Bandung, STIE YKPN, Sleman, Yogyakarta, Indonesia
[2] Department of Management, ARS University, Bandung, Indonesia
[3] Department of Management, ARS University, Bandung, Indonesia
[4] Department of Management, STIE YKPN, Sleman, Yogyakarta, Indonesia

Abstract: This study examines the moderating role of supervisory support in the relationship between high-performance work systems (HPWS) and nurse service quality, mediated by career satisfaction. We used Partial Least Squares Structural Equation Modeling (PLS-SEM) to look at the data from Likert-scale questionnaires filled out by 187 nurses from Tjitrowardojo General Hospital in Purworejo, Indonesia. Our findings reveal that HPWS significantly enhances nurse career satisfaction, which in turn positively affects service quality. Moreover, supervisory support not only directly contributes to improved service quality but also strengthens the impact of HPWS on career satisfaction and, indirectly, on service quality. The implications of these results suggest that hospitals can enhance service quality by fostering supportive supervisory relationships and implementing robust performance systems. These findings contribute to the existing literature by highlighting the crucial role of supervisory support in enhancing the effectiveness of performance systems within healthcare settings.

Keywords: Career satisfaction; High performance work systems; Nurse service quality; Structural equation modeling; Supervisor support; Work environment

I. Introduction

As a critical element of patient care and customer satisfaction, enhancing the quality of nursing services is one of the healthcare industry's primary priorities. Many hospitals and health facilities in Indonesia, like Tjitrowardojo Purworejo General Hospital, have begun using high-performance working systems (also known as high-performance work systems, or HPWS), in an attempt to raise the calibre of these services. The goal of the human resource management strategy known as HPWS is to boost employee happiness and engagement in order to enhance organisational performance. The goal of implementing HPWS is to foster a supportive work environment where nursing staff members experience gratitude and support from management and oversight.

It has been discovered that job satisfaction and intentions to leave the nursing profession are significantly predicted by the quality of the nurse-supervisor relationship[1]. Furthermore, research has demonstrated that flexible shift arrangements, incentive-based pay plans, and a happy work atmosphere can all have a favourable impact on job satisfaction and, in turn, the quality of nursing services.[1][2]. For nurses and other healthcare workers, supervisory support and high-performance work systems (HPWS) are critical elements that determine career satisfaction and, in turn, the quality of care they offer. According to research by Tahiry & Ekmekçioğlu [3] career adaptability has a mediating role in the relationship between career satisfaction and supervisor support[4]. This means that having a supportive supervisor can boost career satisfaction, which may improve the quality of services provided.

Additionally, research like that conducted by Kim and Seo[5] highlights the importance of elements like person-centred nursing and work engagement in determining the calibre of nursing services. The association between work engagement and nursing service quality was found to be mediated and moderated by person-centred nursing, indicating that approaches that prioritise individualised care can improve the quality of nursing care. Furthermore, the Novita & Prasetyo study[6] emphasises how crucial nurse performance and competency are in influencing patient satisfaction and service quality. This suggests that spending money to develop nurses' competencies can result in better patient satisfaction and higher-quality services. Furthermore, the study by Astuti et al. [7] emphasises how important it is for nurses to give care in a consistent, professional manner while paying close attention to the patient's needs. This emphasises how crucial standardised care procedures are to guaranteeing superior nursing services. In many professions, particularly healthcare, the relationship between job satisfaction and high-performance work systems (HPWS) is critical. Studies show that HPWS has a favourable correlation with both overall employee satisfaction [8], and work satisfaction among medical staff [5]. Further research has revealed that HPWS influences the perception of job success through employability orientation and HPWS attribution [9].

HPWS significantly contributes to the development of innovative skills, improving organisational performance and competitiveness[3]. Moreover, research indicates that supervisory assistance has a positive impact on workers' well-being, job happiness, and work engagement, all of which have an impact on productivity inside the company as well as the personal and professional lives of its employees[10]. Thus, important variables that can influence job satisfaction and the calibre of nursing

services are HPWS and supervisory support. Supervisory support and high-performance work systems (HPWS) are important mediators of career satisfaction and, by extension, the quality of nursing services[11].

II. Literature Review
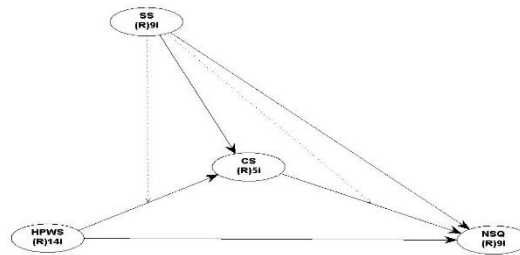
Theoretical Framework and Hypotheses Development

Figure 1. Theoritical Framework[12]

Classical Test Theory

Classical Test Theory (CTT) is a psychometric theory used to forecast test results[13]. First proposed by Charles Spearman in 1904[13], the concept continues to be utilised because of its efficient and uncomplicated method of measurement. According to the CTT theory[13], the observed test scores (X) consist of two components: the true scores (T), which indicate the average score one would achieve if they took the test multiple times independently, and the random measurement errors €[13]. The equation X = T + E gives this relationship. The main principles of classical test theory (CTT) encompass the absence of a relationship between genuine scores and errors, as well as the anticipation that measurement errors will balance out to an average of zero throughout the entire population.

This theory emphasises the overall test score and highlights the importance of reliability and validity as crucial elements in test assessment. The fields of education and psychology commonly use CTT in the development and evaluation of tests with a fixed length.

Despite its widespread use, CTT is not impervious to criticism. The measurement method's limitations include dependence on raw scores, which may not precisely represent the actual test outcomes, and a deficiency in providing clear numeric significance. It does not necessarily imply an individual's competence in carrying out particular activities.

The CTT framework is highly regarded for its straightforward approach to analysing and explaining reliability and validity difficulties. It does not require a deep understanding of statistical distribution functions and mathematical models. Alternative methods, such as Item Response Theory (IRT)[14], evaluate responses by considering the probability associated with individual items rather than overall scores in the case of more intricate assessments[13].

High Performance Work System (HPWS)

The term "HPWS" refers to a collection of organisational procedures that emphasise job enrichment, skill development, and employee engagement. These procedures can increase workers' commitment to their work and levels of job satisfaction. These procedures consist of reworking jobs, providing performance reviews, investing in training and development, and including staff members in decision-making[2]. In contrast, one of the most important factors in determining employee satisfaction is supervisory support. An engaged workplace can boost employee trust and job happiness. Supervisors that exhibit open communication, respect, and concern for their staff members can foster this atmosphere[2]. In addition, studies have demonstrated that positive management practices like vocal encouragement, constructive criticism, and problem-solving assistance greatly increase worker job satisfaction[15]. The goal of high performance work systems, also known as high-commitment workplaces, high-involvement work systems, high performance practices, and high performance workplaces, is to improve organisational performance by developing employees' skills and commitment [16]. A high-performance work environment, on the other hand, increases the value, uniqueness, and unmistakability of employees' knowledge and abilities, resulting in improved performance and a competitive edge [17]. According to research, HPWS—which entails actions including in-depth training, selective hiring, involvement in decision-making, and performance management—influences employee attitudes and behaviours, which in turn affect how well employees and organisations operate [18]. The context in which health care organisations operate is dynamic, unclear, and ever-changing. Owing to these dynamics, organisations now face new challenges and must adopt a new focus to continuously improve their performance in order to maintain their competitive excellence. Improving organisational performance through the use of High Performance Work Systems (HPWS) and removing barriers to organisational effectiveness is one of the most crucial factors in maintaining and attracting new customers [19].

High-Performance Work Systems (HPWS) are designed to maximize employee potential and are associated with improved job satisfaction and performance. In the context of healthcare[19], HPWS can provide nurses with the resources, autonomy, and support necessary to excel in their roles, thereby enhancing service quality. However, the mediating role of career satisfaction

between HPWS and service quality suggests a complex interplay where enhanced job satisfaction through systemic and supervisory support can potentially lead to either an improvement or a plateau in service quality due to various underlying factors[16]. High-Performance Work Systems (HPWS) are posited to positively affect nurses' career satisfaction by providing comprehensive support, including training and development, which align with nurses' intrinsic and extrinsic motivations[20][18].

Supervisor Support

The role of supervisor support in this dynamic cannot be overstated. Supervisors who provide clear communication, fair treatment, and support for professional development contribute to the job satisfaction of their nurses[21]. Moreover, this support is not merely about improving morale but also about helping nurses navigate the complexities and stresses of their work, which in turn can lead to improved service quality[22][23]. The current crisis has made clear how important supervisory support (SS) is to the career happiness and adaptation of healthcare workers [24]. The impact of supervisory support on presenteeism was substantial [20], because supervisory support are seen as a form of compensation in an organisation[25]. The impact of supervisory support is crucial in fostering job satisfaction and lowering employees' intentions to leave their jobs[26].

In advanced research, supervisory support can serve as both a moderation variable and an independent variable. Here's the explanation and reason for the route. Because support from a superior can stand alone in affecting employee career satisfaction, we can regard supervisory support as an independent variable. In this context, supervisors' support can directly impact employees' work satisfaction without relying on other variables. Supervisory support can also act as a moderation variable if research wants to explore how supervisory support affects the strength or direction of the relationship between HPWS and career satisfaction or between career satisfaction and turnover intentions. For example, the effect of HPWS on career satisfaction may be stronger when supervisor support is high, suggesting that supervisor support can reinforce the positive impact of HPMS on career satisfaction.

Social exchange theory. This theory suggests that the relationship between employees and superiors is a mutual relationship in which support from superiors can improve the quality of such exchanges, allowing the superiors to be catalysts that strengthen the link between the working environment and employees' reactions.

Organizational Support Theory. According to this theory, employees' perceptions of how much an organization values their contributions and cares about their well-being can affect a variety of work outcomes, including career satisfaction and the intention to move jobs. Support from supervisors, as representatives of organizations, can play an important role in shaping such perceptions.

Career Satisfaction

Edwin Locke's definition, which describes job satisfaction as a pleasant or good emotional state arising from an appraisal of one's job or employment experience[4], is the one that is most frequently used. Nevertheless, there are broader definitions of job satisfaction than just the pleasant emotions that are typically thought to be the primary factors influencing how people see and interact with their professions [27]. Studies have repeatedly shown that nurses, in particular, who work in circumstances that present a variety of problems, frequently need to successfully manage their emotions. Because of this expectation of emotional labour and the inherent pressures in the healthcare sector, nurses are under a lot of strain, which can negatively affect their job satisfaction and, in turn, the standard of care that they offer [15].

Career satisfaction among nurses is an influential factor in healthcare delivery and is impacted by a myriad of elements ranging from personal 58ulfilment to professional growth opportunities[28]. It's well-established that career satisfaction can lead to enhanced job performance[29], which is crucial in nursing due to its direct correlation with patient care and outcomes. Career satisfaction among nurses is an essential factor influencing nurse service quality. It is suggested that when nurses perceive their careers as fulfilling and aligning with their professional goals, they are more likely to deliver higher quality care to patients[26]. This notion is supported by the idea that a satisfied workforce is generally more productive and engaged, contributing positively to overall organizational performance[30].

Nurse Service Quality

Nurse service quality is a critical outcome for healthcare institutions, often determining patient satisfaction and overall healthcare effectiveness[31][32]. The quality of service provided by nurses is not solely dependent on their competencies but also on the satisfaction they derive from their careers, which influences their motivation and attention to care[20][33].

Based on nursing expertise and advice directed at people, families, groups, or communities, both well and ill, nursing services are a type of professional service that is an essential component of health services. Nurses must be highly motivated when delivering nursing care services [34]. The ability to execute the Nursing Practice Act with accuracy, speed, ease, and expertise determines the quality of nursing services provided by the institution. The effectiveness and efficiency of the current hospital system's structural components determine what nursing services mean. Quality nursing care is one of everyone's fundamental needs. Professionals in the fields health and nursing are currently working to improve the following areas: nursing care quality, nursing devices, nursing professionalism, and nursing self-worth [35].

In this chapter, the researcher looks at the existing research and finds a gap: earlier studies haven't gone far enough in developing theories or providing empirical evidence about how career satisfaction affects the quality of nurse service in high-performance work systems. They also haven't looked into the role of supervisory support in this setting. To bridge this gap, the researcher

formulates eight hypotheses titled The Moderating Role of Supervisor Support in the Mediating Effect of Career Satisfaction on High Performance Work Systems: A Path to Enhanced Nurse Service Quality based on the provided conceptual framework. Theoretical foundations support these hypotheses and provide detailed explanations.

H1(+): In nursing staff, high-performance work systems (HPWS) are positively associated with career satisfaction (CS).

According to HRM theory, HPWS, which includes comprehensive training, employee empowerment, and performance incentives, should enhance job satisfaction by providing employees with the skills, autonomy, and motivation they need to excel in their roles. The Resource-Based View (RBV) suggests that organizational systems that provide resources, such as HPWS, contribute to employee satisfaction by enabling better performance and career growth opportunities.

H2(+): HPWS have a direct positive impact on nurse service quality (NSQ).

The systems approach to quality management posits that well-designed work systems lead to better process outcomes, which in healthcare translates to improved service quality by nurses. The theory of performance improvement posits that structured and efficient work systems directly contribute to the quality of outputs, in this case the service provided by nurses.

H3(+): HPWS indirectly influence NSQ through career satisfaction (CS).

The job demands-resources model suggests that resources provided by HPWS can reduce job demands and increase job resources, leading to higher job satisfaction, which in turn may lead to improved job performance and service quality. According to mediation theory, HPWS positively impacts service outcomes by enhancing employee satisfaction, as engaged employees are more likely to provide high-quality services.

H1–H3: These hypotheses emphasize the pivotal role of HPWS in enhancing career satisfaction and, subsequently, the quality of nursing services. They reflect the direct and indirect pathways through which structured, resource-rich work environments can lead to better healthcare outcomes.

H4(+): Career satisfaction (CS) and supervisory support (SS) have a positive correlation.

According to Relational Exchange Theory, supportive relationships in the workplace lead to higher levels of employee satisfaction because they fulfill psychological contract obligations. Social exchange theory implies that when nurses perceive support from their supervisors, they are likely to experience higher levels of job satisfaction due to a sense of obligation and reciprocity.

H5 (+): Supervisory support (SS) directly enhances nurse service quality (NSQ).

The impact theory argues that direct support from leadership has a tangible effect on employee performance and, subsequently, on the quality of service they provide. The supportive leadership theory suggests that support from supervisors can improve employees' performance by providing them with the necessary guidance, feedback, and resources.

H6 (+): Career satisfaction (CS) mediates the indirect positive effect of supervisory support (SS) on nurse service quality (NSQ).

The conservation of resources theory indicates that supervisory support can be a critical resource for nurses, leading to greater career satisfaction, which in turn can conserve the psychological resources needed for providing high-quality service.

H4–H6: These posit the crucial role of supervisors in not only directly influencing nurse service quality but also in enhancing it indirectly through boosting career satisfaction. It acknowledges the dual pathway through which SS affects NSQ.

H7 (+): The relationship between high-performance work systems (HPWS) and nurse service quality (NSQ) is strengthened when supervisor support (SS) is high.

According to the Moderating Role of Leadership, supportive leadership amplifies the effectiveness of organizational systems and suggests that SS strengthens the beneficial effects of HPWS on NSQ.

H8 (+): The level of Supervisor Support (SS) moderates the positive effect of Career Satisfaction (CS) on Nurse Service Quality (NSQ), with the effect being stronger when SS is higher.

According to Social Support Theory, the presence of supportive relationships, such as those with supervisors, magnifies positive work outcomes, specifically the influence of CS on NSQ.

H7–H8: These introduce the idea of moderation, suggesting that the positive pathways identified in H1–H6 are contingent upon the level of SS. They emphasize the nuanced role that supervisory support plays in either facilitating or constraining the real benefits of HPWS and CS on NSQ.

III. Research Methodology

This research delves into the experiences of nurses working at Tjitrowardojo General Hospital, Purworejo. We surveyed a total of 187 nurses for this study[4]. The data collection involved distributing questionnaires on March 30, 2024, which utilized a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing respondents to express the extent of their agreement with various statements regarding their work environment and support systems.

We disseminated the questionnaires to a randomly selected group of willing nurses, ensuring a degree of randomness in the selection process. This approach helps reduce selection bias, contributing to the reliability of the gathered data.

The study uses partial least squares structural equation modeling (PLS-SEM), a multivariate statistical analysis method that is becoming more popular in many research areas because it can handle complex models, such as latent constructs, with ease. PLS-SEM is particularly adept at prediction and theory building in exploratory research, making it well-suited for this study's objectives[36][37][38].

The PLS analysis process unfolds in several distinct stages.

This stage entails evaluating the measurement model, also known as the outer model. This stage assesses the reliability and validity of the constructs used in the research. It ensures that the items used to measure the variables are consistent and accurately reflect the constructs they intend to measure.

Testing of the model fit. This phase assesses the extent to which the collected data aligns with the proposed model, thereby confirming the empirical evidence's support for the theoretical framework.

The hypothesis was tested. Hypothesis testing in PLS-SEM involves checking the path coefficients to determine the strength and significance of the relationships between constructs.

Mediation and Moderating Analysis[39][40][12].

This advanced stage of analysis assesses the indirect effects between variables (mediation) and how certain variables might alter the strength or direction of the relationship between other variables (moderation).

This study measures the high-performance work system using an established instrument from previous literature [17]. We gauged supervisory support using measures [41], assessed career satisfaction using measurements [26], and evaluated nurse service quality using metrics [33]. These measures, sourced from validated and peer-reviewed academic literature, bolster the methodological rigor of the study and provide a solid foundation for the analysis and interpretation of the research findings.

Table 1. Demographic Information

Variable	Categories	Frequency	%
Gender	Male	47	25.7
	Female	139	74.3
	Total	187	100.0
Age Group	20-25	7	3.7
	26-30	40	21.4
	>30	140	74.9
	Total	187	100.0
Length of Work	<1 Years	6	3.2
	1-5 Years	38	20.3
	6-10 Years	46	24.6
	>10 Years	97	51.9
	Total	187	100.0

These demographics serve as a backdrop for the analysis of how high-performance work systems and supervisory support can mediate career satisfaction and improve nurse service quality. The data implies that the findings will reflect insights from a predominantly seasoned workforce, which may possess well-formed attitudes towards the interplay of organizational support, personal career fulfillment, and service delivery outcomes.

The demographic profile of the study participants is predominantly female, representing 74.3% (139 out of 187) of the sample, while males account for 25.7% (47 out of 187). This gender distribution is reflective of the broader trends in the nursing profession, where female representation is traditionally higher.

The sample's age distribution shows a concentration of more experienced individuals, with a significant majority of 74.9% (140 out of 187) being over 30 years old. The 26–30 age group comprises 21.4% (40 out of 187), while the 20–25 age group makes up the smallest segment at 3.7% (7 out of 187). The preponderance of the older age group suggests that the respondents bring a wealth of experience to the study, which may influence their perceptions of career satisfaction and the effectiveness of high-

performance work systems.

When examining the length of service, it is evident that long-term employment is common among the participants. Those with over ten years of experience constitute the largest category at 51.9% (97 out of 187), followed by the 6–10 year category at 24.6% (46 out of 187). Respondents with 1–5 years of service represent 20.3% (38 out of 187), and those with less than one year account for the smallest group at 3.2% (6 out of 187). The longevity of service is indicative of a stable workforce and suggests potential deep-rooted perceptions of work systems and career development within the sample.

The sample's experience-rich profile provides fertile ground for exploring the intricate dynamics of how established work systems and supervisory relationships impact career satisfaction. Given that the majority of respondents have significant work tenure, they can offer nuanced feedback on the long-term effects of HPWS and the quality of supervisory support on their career satisfaction and consequent service quality. The insights derived from such a demographic can guide healthcare organizations in tailoring their high-performance work systems and supervisory support mechanisms to enhance the quality of care, considering the profound influence of career satisfaction as a mediator in this relationship.

IV. Result And Discussion

According to table 2, Ten Global Model Fit

We used Partially Least Squares Structural Equation Modeling (PLS-SEM) to explore the connections between High Performance Work Systems (HPWS), Supervisor Support (SS), Career Satisfaction (CS), and Nurse Service Quality (NSQ). The data underpinning this research, collected from 187 nursing staff at Tjitrowardojo General Hospital, Purworejo, forms the bedrock of the nuanced investigation presented herein.

The strong pathway presence in the model, as shown by the average path coefficient (APC) of 0.281 and a p-value below 0.001, suggests that the implemented HPWS has a strong relationship with nurses' job satisfaction and service quality. The average R-squared (ARS) and average adjusted R-squared (AARS) values are both above 0.48. This means that the model explains a moderate to substantial amount of the variance in the dependent variables. This supports the strong relationship between the variables that were studied.

The Average Variance Inflation Factor (AVIF) and Average Full Variance Inflation Factor (AFVIF) stood at 1.703 and 2.646, respectively. These figures, well below the cautionary threshold of 5, affirm that multicollinearity is not of concern, thus validating the independence and reliability of the predictors.

The model's goodness of fit (GoF), quantified at 0.618, surpasses the acceptable threshold of 0.25 and edges towards the ideal marker of 0.36. The strong fit demonstrates a close match between the theoretical framework and the observed data.

The Simpson's paradox ratio (SPR) at 0.833 and the R-squared contribution ratio (RSCR) at 0.994 both surpass the required benchmarks, indicating that the relationships within the model are consistent and directionally accurate. The Statistical Suppression Ratio (SSR), perfect at 1.000, implies there are no suppressor variables confounding the model. Additionally, the nonlinear bivariate causality direction ratio (NLBCDR) of 0.750 exceeds the threshold of 0.7, underscoring the validity of the model's causality assumptions.

Table 2. Ten Global Model Fit [37][12]

Measure	Value	P	Acc if		Ideally
APC	0.281	<0.001	-		-
ARS	0.489	<0.001	-		-
AARS	0.481	<0.001	-		-
AVIF	1.703	-	<= 5		<= 3.3
AFVIF	2.646	-		<= 5	<= 3.3
GoF	0.618	-		>= 0.25	>= 0.36
SPR	0.833	-		>= 0.7	= 1
RSCR	0.994	-		>= 0.9	= 1
SSR	1.000	-		>= 0.7	-
NLBCDR	0.750	-		>= 0.7	-

Ten global model fit [13][43][44]

APC (Average Path Coefficient), at 0.281 with a significance level of $p<0.001$, the average strength of the relationships in the model is good, and the paths in the model are generally significant.

ARS (Average R-squared), the ARS value of 0.489 indicates that, on average, the model explains a moderate to good amount of variance in the dependent variables.

AARS (Average Adjusted R-squared), at 0.481, this suggests that the explanatory power of the model is consistent even after adjusting for the number of predictors.

AVIF (Average Variance Inflation Factor), with a value of 1.703, it is below the threshold of 5, indicating no concerning multicollinearity among predictors. It is also close to the ideal threshold of 3.3.

AFVIF, similarly, at 2.646, this value suggests a satisfactory level of multicollinearity.

GoF (Goodness of Fit) the value of 0.618 is well above the minimum acceptable level of 0.1, indicating that the model has a large goodness of fit.

SPR (Simpson's Paradox Ratio), the value is 0.833, which is above the acceptable threshold, meaning that the model is consistent in the direction of its relationships.

RSCR (R-squared Contribution Ratio), the very high value of 0.994 indicates that the model's R-squared values are reliable and not influenced by any suppressor variables.

SSR (Statistical Suppression Ratio), a perfect score of 1.000 suggests that there is no suppression effect, where the inclusion of a variable would increase the predictive validity of another.

NLBCDR (Nonlinear Bivariate Causality Direction Ratio), at 0.750, this indicates a good level of causality direction in the model, suggesting that the specified direction of relationships is generally correct

Table 3. Combined loadings and cross-loadings [45]

	HPWS	SS	CS	NSQ	Type (a	SE	P value
HPWS	0.690	0.523	-0.261	-0.335	Reflect	0.073	<0.001
Ind2	0.659	-0.050	-0.466	0.090	Reflect	0.073	<0.001
_2	0.766	-0.074	-0.264	0.014	Reflect	0.072	<0.001
_3	0.755	-0.004	-0.173	0.144	Reflect	0.072	<0.001
_4	0.797	0.050	0.212	-0.004	Reflect	0.071	<0.001
_5	0.759	0.089	0.202	-0.139	Reflect	0.072	<0.001
_6	0.801	-0.055	0.059	0.075	Reflect	0.071	<0.001
_7	0.790	-0.001	0.353	-0.050	Reflect	0.071	<0.001
_8	0.768	0.057	0.091	-0.120	Reflect	0.071	<0.001
_9	0.753	-0.098	0.086	-0.054	Reflect	0.072	<0.001
_10	0.771	0.174	0.128	-0.202	Reflect	0.071	<0.001
_11	0.675	-0.248	-0.217	0.382	Reflect	0.073	<0.001
_12	0.738	-0.187	-0.136	0.234	Reflect	0.072	<0.001
_13	0.746	-0.175	0.249	-0.002	Reflect	0.072	<0.001
SUPERVI	-0.174	0.824	0.226	-0.096	Reflect	0.071	<0.001
_14	-0.317	0.837	0.270	-0.097	Reflect	0.070	<0.001
_15	0.168	0.849	-0.176	0.065	Reflect	0.070	<0.001
_16	-0.097	0.830	0.045	0.192	Reflect	0.070	<0.001
_17	-0.042	0.820	0.059	-0.170	Reflect	0.071	<0.001
_18	0.075	0.688	-0.382	0.302	Reflect	0.073	<0.001
_19	0.293	0.818	-0.220	0.180	Reflect	0.071	<0.001

_20	-0.056	0.845	0.129	-0.110	Reflect	0.070	<0.001
_21	0.160	0.858	-0.016	-0.207	Reflect	0.070	<0.001
CAREER_	-0.106	-0.011	0.889	-0.063	Reflect	0.069	<0.001
_22	-0.032	0.080	0.880	-0.162	Reflect	0.070	<0.001
_23	0.205	-0.124	0.834	0.217	Reflect	0.070	<0.001
_24	-0.072	0.006	0.918	-0.004	Reflect	0.069	<0.001
_25	0.019	0.040	0.909	0.023	Reflect	0.069	<0.001
NURSE_S	0.316	-0.387	-0.000	0.801	Reflect	0.071	<0.001
_26	0.025	-0.136	-0.036	0.831	Reflect	0.070	<0.001
_27	0.197	-0.156	-0.193	0.877	Reflect	0.070	<0.001
_28	-0.099	-0.064	-0.058	0.842	Reflect	0.070	<0.001
_29	0.060	0.080	-0.141	0.903	Reflect	0.069	<0.001
_30	-0.231	0.341	0.236	0.797	Reflect	0.071	<0.001
_31	-0.153	0.121	0.227	0.865	Reflect	0.070	<0.001
_32	-0.104	0.183	-0.094	0.898	Reflect	0.069	<0.001
_33	-0.009	0.001	0.089	0.844	Reflect	0.070	<0.001

Notes: Loadings are unrotated and cross-loadings are oblique-rotated. SEs and P values are for loadings. P values < 0.05 are desirable for reflective indicators.

According to table 3. Combined loadings and cross-loadings

The loadings The loadings signify the relationship strength between indicator variables and their respective latent constructs (HPWS, SS, CS, NSQ). A loading of 0.7 or higher typically indicates a strong and acceptable relationship, suggesting that the indicator reflects the construct well. The negative loadings for certain indicators on HPWS and NSQ hint at a possible inverse relationship, which could be of substantive interest.

To assess discriminant validity, we use cross-loadings, which compare an indicator's loading on its own construct with its loading on other constructs. An indicator should exhibit the highest loading on its intended construct, relative to its loading on other constructs. The oblique-rotated cross-loadings should ideally reflect this pattern. The P values, all of which are less than 0.001, indicate highly significant relationships between the indicators and their respective constructs.

The loadings for the HPWS items show strong correlations with their construct, with values such as 0.690 for HPWS itself, indicating that these items are good indicators of the HPWS construct in this setting. Reflective-type indicators, all with p-values less than 0.001, confirm the items' statistical significance. The loadings for SS items also show strong correlations, especially with the construct of supervisory support (a loading of 0.824 for SS shows this), which means that these items accurately reflect how nurses see supervisory support.

For the Career Satisfaction construct, the items show very high loadings, with CS at 0.889, indicating an excellent representation of the career satisfaction of the nursing staff. Similarly, the Nurse Service Quality construct's items exhibit high loadings, with values like 0.801 for NURSE_S, suggesting a strong relationship between the items and the overall service quality delivered by nurses.

The analysis of these loadings and cross-loadings, particularly with their significant p-values, underlines the measurement model's reliability and validity. The results indicate that the constructs used in the model accurately reflect the perceptions and experiences of the nurses regarding HPWS, SS, CS, and NSQ.

Table 4. Correlations among l.vs. with sq. rts. Of AVEs (Fornell-larcker discriminatory validity)

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
HPWS	0.746	0.764	0.751	0.499	0.154	0.047
SS	0.764	0.802	0.676	0.541	0.105	0.038
CS	0.751	0.676	0.879	0.351	0.046	-0.130

NSQ	0.499	0.541	0.351	0.849	0.168	0.208
SS*HPWS	0.154	0.105	0.046	0.168	1.000	0.773
SS*CS	0.047	0.038	-0.130	0.208	0.773	1.000

Note: Square roots of average variances extracted (AVEs) shown on diagonal.

P values for correlations

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
HPWS	1.000	<0.001	<0.001	<0.001	0.029	0.505
SS	<0.001	1.000	<0.001	<0.001	0.139	0.596
CS	<0.001	<0.001	1.000	<0.001	0.516	0.067
NSQ	<0.001	<0.001	<0.001	1.000	0.018	0.003
SS*HPWS	0.029	0.139	0.516	0.018	1.000	<0.001
SS*CS	0.505	0.596	0.067	0.003	<0.001	1.000

According to table 4, Cross-Loading & Fornell-larcker discriminatory validity [48]

High Performance Work Systems (HPWS). HPWS shows strong correlations with all other constructs, particularly Supervisor Support (SS) with a correlation coefficient of 0.764, indicating a significant overlap in the concepts measured by HPWS and SS. The square root of AVE for HPWS is 0.746, which exceeds the correlation with other constructs, demonstrating good discriminant validity.

Supervisor Support (SS). SS correlates highly with both HPWS and Career Satisfaction (CS), with coefficients of 0.764 and

0.676 respectively. This implies that SS not only contributes significantly to the implementation of HPWS but also positively impacts nurse career satisfaction. The square root of AVE for SS is 0.802, affirming strong construct reliability and appropriate discriminant validity as it is higher than its correlation with other constructs.

Career Satisfaction (CS). CS shows a substantial correlation with HPWS (0.751) and a moderate correlation with Nurse Service Quality (NSQ) (0.351), highlighting its central role as a mediator in the model. The correlation between CS and NSQ, although lower than with HPWS and SS, is statistically significant, suggesting that higher career satisfaction can lead to better service quality. The AVE for CS is 0.879, indicating excellent reliability and discriminant validity.

Nurse Service Quality (NSQ). NSQ is notably correlated with SS (0.541) and moderately with HPWS (0.499), indicating that both the systemic and support dimensions significantly impact service quality. The square root of AVE for NSQ is 0.849, which is higher than its correlations with other constructs, ensuring good discriminant validity.

Interaction Terms (SS-*HPWS and SS-CS*). The interaction term SSHPWS shows a correlation coefficient of 0.154 with HPWS and 0.105 with SS, suggesting a moderate moderating effect of SS on the relationship between HPWS and other outcomes. SSCS displays even lower correlation values with CS (0.046) and SS (0.038), but a significant correlation with NSQ (0.208). This indicates that the combined effect of SS and CS significantly influences NSQ. The correlation of 0.773 between the two interaction terms highlights their interconnectedness in affecting outcomes.

P-values for Correlations. The P-values associated with these correlations are predominantly below 0.05, indicating statistically significant relationships among the constructs. Notably, the correlations between HPWS and SS, CS, and NSQ are all highly significant (P < 0.001). The interaction terms show varying levels of significance, with SS-HPWS having a more significant influence on NSQ than on other constructs.

According to table 5, Latent Variables Coefficient (Average Variance Extracted) [47]**.**

R-squared values. The R-squared values for HPWS and SS are 0.587 and 0.394, respectively, indicating moderate to strong explanatory power regarding the variance in these constructs. This suggests that the model explains a significant portion of the variance in HPWS and SS.

Composite reliability. The high composite reliability scores for HPWS (0.946), SS (0.944), and CS (0.959) show that the constructs are internally consistent, with scores above the 0.7 threshold that means the scales are reliable.

Cronbach's alpha. The Cronbach's alpha for all constructs is above 0.9, indicating excellent internal consistency and reliability of the items within each construct.

Average variance extracted (AVE). AVE scores for all constructs are above 0.5, which is the commonly accepted threshold, indicating satisfactory convergent validity.

The full collinearity VIF (variance inflation factor). values below the threshold of 5 suggest that multicollinearity is not a concern for this model, indicating that the predictors are relatively independent.

Q-squared (Stone-Geisser's Q2). Q-squared values, particularly for HPWS (0.602), indicate the model has predictive relevance for the constructs, with values above 0 suggesting the model's predictive accuracy.

Skewness and kurtosis. The skewness and kurtosis values suggest that the data distribution does not deviate excessively from normality, implying that the data are reasonably symmetric and do not have problematic tails.

Unimodality. The unimodal assessments (RS and KMV) indicate that the data do not show a significant departure from unimodality, which is desirable for SEM analysis.

Normality tests (Jarque-Bera and Robust Jarque-Bera). Normal-JB suggests that some constructs do not follow a normal distribution, whereas Normal-RJB indicates that, with robust assessment, some constructs exhibit normality. This highlights the importance of employing robust statistical methods capable of handling non-normality in SEM.

Overall, the data in the table supports the validity and reliability of the SEM model that this study used. The model shows good internal consistency, convergent validity, and predictive relevance. We can also use PLS-SEM techniques to examine the relationships between HPWS, SS, CS, and NSQ, as well as their interaction terms, as they do not exhibit multicollinearity and generally align with unimodality and normality assumptions. The results provide empirical support for the theoretical framework suggesting that supervisory support moderates the relationship between HPWS and career satisfaction, which in turn impacts nurse service quality. These insights are instrumental for healthcare organizations aiming to optimize their work systems and supervisory support structures to enhance overall service quality.

According to table 6 Path Coefficient (Structural Model/Inner Model) [49]

CS works in conjunction with HPWS and SS.

The path coefficient from HPWS to CS is 0.561, and from SS to CS is 0.247, both of which are statistically significant with p-values less than 0.001. This implies a strong positive influence of HPWS and SS on CS, suggesting that effective work systems and supportive supervisory behaviors substantially increase career satisfaction among nurses. The interaction term SS*HPWS has a path coefficient of -0.032 when predicting CS, but this is not statistically significant (p-value 0.324). This suggests that the interaction between SS and HPWS does not have a discernible effect on career satisfaction.

The NSQ operates as a function of SS and CS. SS and CS positively influence NSQ, with path coefficients of 0.467 and 0.156, respectively.

The relationship between SS and NSQ is highly significant (p < 0.001), indicating that supervisory support directly contributes to the quality of nursing services. CS's influence on NSQ, while statistically significant (p = 0.012), has a smaller path coefficient. This demonstrates a positive but more modest impact of career satisfaction on service quality. A significant path coefficient of 0.226 and a p-value of less than 0.001 indicate that combining supervisory support and career satisfaction significantly enhances nurse service quality.

The model's findings highlight the central role that HPWS and SS play in fostering an environment that promotes CS, which is crucial in improving the quality of nursing services. The interaction effects indicate that while SS is effective on its own in enhancing NSQ, its impact is even more pronounced when nurses also experience high levels of career satisfaction.

According to table 7, Linear and nonlinear (warped) relationships among latent variables [50]

Career satisfaction (CS). The 'Warped' indicator indicates the relationships between High-Performance Work Systems (HPWS) and CS, Supervisor Support (SS) and CS, and the interaction term SS-CS. This suggests that the effects of HPWS and SS on CS are not strictly linear but may follow a more complex, possibly curvilinear, relationship. The warped nature of these relationships implies that increases in HPWS and SS may lead to greater increases in CS after certain thresholds are met, or there could be diminishing returns at higher levels of HPWS and SS.

Nurse Service Quality (NSQ). The table demonstrates the 'warped' relationships between SS and NSQ, CS and NSQ, as well as the interaction term SS-CS with NSQ. This indicates that as supervisory support and career satisfaction increase, their impact on nursing service quality may intensify in a non-proportional manner. For instance, a threshold may exist where minor enhancements in CS result in significant improvements in NSQ, or vice versa.

HPWS and SS. There is no indication that HPWS and SS have warped relationships directly with other constructs. This suggests that the study did not find evidence of nonlinearity in these relationships, or that these specific relationships were not the focus of the nonlinear analysis.

The presence of warped relationships in the model adds a layer of complexity to the interpretation of the data. It implies that simply examining the direction and strength of the relationships (as done in linear models) may not fully capture the dynamics at play. Instead, the model acknowledges the nuanced nature and potential influence of factors that cause the relationship between work systems, supervisory support, career satisfaction, and service quality to deviate from a straight line.

According to table 8, Indirect and total effects[51][49][46][52][51]

Indirect Effects Analysis

The table assesses the indirect effects that occur when a path between two variables is mediated by a third variable. In this case, it shows the indirect effects on Nurse Service Quality (NSQ) from High-Performance Work Systems (HPWS) and Supervisor Support (SS), mediated by Career Satisfaction (CS).

HPWS to NSQ through CS: The indirect effect size is 0.087, which is statistically significant with a P value of 0.039. This indicates that HPWS positively affects NSQ through its impact on CS. The effect size of 0.044 suggests that this indirect pathway has a small but significant influence on NSQ.

SS to NSQ through CS: The indirect effect size is 0.038, which is not statistically significant, as indicated by a P value of 0.220. This implies that the path from SS through CS to NSQ is not strong enough to be considered significant in this model.

SS-HPWS to NSQ through CS: An indirect effect size of -0.005 with a P value of 0.460 suggests no significant indirect effect of the interaction term SS-HPWS on NSQ through CS.

Total Effects Analysis

Total effects encompass both direct and indirect effects of one variable on another within a path model.

Career Satisfaction (CS). The total effect of HPWS on CS is 0.561, and from SS on CS is 0.247. Both effects are significant with P values of less than 0.001. This suggests a strong and significant total effect of both HPWS and SS on career satisfaction of nurses.

Nurse Service Quality (NSQ). The total effect of SS on NSQ is quite substantial, with a value of 0.506, and it is statistically significant ($P < 0.001$). The effect of CS on NSQ is also significant with a total effect size of 0.156 and a P value of 0.012. The interaction term SS-CS shows a significant total effect size of 0.226 on NSQ, indicating a meaningful impact on NSQ when both supervisor support and career satisfaction are considered.

Standard Errors and Effect Sizes

Standard errors are associated with all indirect and total effects, providing an estimate of the margin of error in the effects. The standard errors for the indirect effects are all around 0.050, and similarly, for total effects, they range from 0.049 to 0.069, indicating precision in these estimates.

Effect sizes provide a quantitative measure of the importance of an effect. In the context of this study, effect sizes for indirect effects are smaller compared to those for total effects, which is expected as indirect effects are typically more subtle than direct effects.

The detailed analysis indicates that High-Performance Work Systems (HPWS) and Supervisor Support (SS) significantly impact Nurse Service Quality (NSQ), both directly and indirectly, via Career Satisfaction (CS). The significant total effects highlight the substantial influence of HPWS and SS on CS and NSQ in the context of the healthcare environment.

This data provides valuable insights for healthcare administrators looking to enhance service quality. By understanding the direct and mediated effects of HPWS and SS on career satisfaction and nurse service quality, healthcare organizations can strategically focus their resources on areas that yield significant improvements in nurse satisfaction and patient care outcomes.

According to Figure 3, Measurement Model Evaluation Result[12][49][40]

High-Performance Work Systems (HPWS) and Career Satisfaction (CS)

The diagram illustrates a strong positive relationship between HPWS and CS, as indicated by a path coefficient (β) of 0.56, which is statistically significant ($p<0.01$). This finding suggests that when nurses perceive their work environment as high-performing—characterized by effective communication, opportunities for development, and a supportive culture—it substantially contributes to their career satisfaction. The R^2 value of 0.58 for CS indicates that the model's variables, particularly the HPWS, account for 58% of the variability in career satisfaction among nurses.

Supervisor Support (SS) and Career Satisfaction (CS)

Supervisor Support (SS) also shows a positive association with CS ($\beta = 0.25$, $p<0.01$), indicating that supportive behaviors from supervisors, such as feedback, encouragement, and resources, correlate with higher levels of career satisfaction among nurses. However, SS does not show a significant direct relationship with HPWS ($\beta = -0.03$, $p = 0.32$), suggesting that the influence of SS on HPWS is not straightforward and may be more nuanced.

Career Satisfaction (CS) as a Mediator

CS serves as a mediator between HPWS and NSQ. While the direct path from HPWS to NSQ is not significant ($\beta = 0.10$, $p = 0.07$), suggesting HPWS alone does not suffice to enhance NSQ, the indirect path through CS is significant ($\beta = 0.15$, $p = 0.01$).

This finding highlights the complex mediating role of career satisfaction, which stems from high-performance work systems and leads to enhanced nurse service quality.

Supervisor Support (SS) and Nurse Service Quality (NSQ)

The direct impact of SS on NSQ is substantial ($\beta = 0.38$, $p<0.01$), reflecting that when supervisors provide support, it translates directly into higher service quality. SS also indirectly influences NSQ via CS (the interaction term is significant), underscoring the multifaceted role of supervisory support.

The Moderating Effect of Supervisor Support

The moderation analysis reveals a pivotal role for supervisor support as it relates to career satisfaction and its impact on service quality. When predicting NSQ, the interaction term SS*CS is significant, indicating that the strength of the relationship between career satisfaction and service quality is dependent upon the level of supervisory support. This suggests that the more support supervisors provide, the more likely it is that the nurses' career satisfaction will lead to enhanced service quality.

The model's R2 for NSQ is 0.31, meaning its factors account for 31% of the variance in nurse service quality

These insights are vital for healthcare administrators as they highlight the synergistic effect of combining high-performance work systems with supervisory support to enhance career satisfaction, which in turn elevates the quality of service delivered by nurses. Robust supervisory support must complement the effective implementation of HPWS to fully realize HPWS's potential for improving service quality.

Discussion

According to Figure 2. View two graphs with low-high values of moderating variable and data points.

Low Supervisor Support (Low SS). In the left scatter plot, the relationship between HPWS and CS under conditions of low supervisor support appears to follow a nonlinear, possibly quadratic pattern. The curvature suggests that at lower levels of HPWS, increments in these systems might not significantly influence career satisfaction, or the effect may even be slightly negative. However, as HPWS increases past a certain threshold, career satisfaction begins to rise considerably. This could indicate that without the foundational support of supervisors, the benefits of HPWS on career satisfaction are not fully realized until a substantial level of HPWS is present.

High Supervisor Support (High SS). The right scatter plot with high supervisor support shows a more pronounced curve, implying a stronger and more positive relationship between HPWS and career satisfaction when supervisor support is high. This plot suggests that even modest levels of HPWS in conjunction with high supervisor support can result in increased career satisfaction. Furthermore, as HPWS levels rise, the rate of increase in career satisfaction also accelerates, indicating a potentially exponential relationship.

Low Supervisor Support (Low SS). In the left plot, there is an interesting non-linear pattern between CS and NSQ under conditions of low supervisor support. Initially, as CS increases, NSQ decreases, reaching a nadir, and then as CS continues to rise, NSQ sharply increases. This U-shaped curve suggests that at low levels of supervisor support, moderate increases in career satisfaction may not immediately translate into enhanced service quality. However, beyond a certain level of career satisfaction, the quality of service provided by nurses improves significantly.

High Supervisor Support (High SS). The right plot shows a similar U-shaped relationship but with a noticeable shift upwards. In this context, even with minimal CS, NSQ starts at a higher point compared to the "Low SS" scenario. As CS increases, there's an initial dip in NSQ, but it quickly starts to rise as CS continues to grow, suggesting that high supervisor support buffers the initial negative impact of low career satisfaction on service quality.

These visual patterns suggest that supervisor support might play a moderating role in the relationship between HPWS and career satisfaction. In the context of low supervisor support, HPWS may need to reach a higher level to overcome the lack of support and positively impact career satisfaction. Conversely, when supervisor support is high, the positive effects of HPWS on career satisfaction are not only more immediate but also more substantial.

The difference in the relationship patterns across the two plots emphasizes the importance of considering supervisory support as a key component in enhancing the efficacy of HPWS. The data suggest that healthcare organizations aiming to leverage HPWS to boost career satisfaction may also need to ensure that their supervisory structures are supportive, as this could amplify the positive effects of their work systems.

These patterns indicate that supervisor support may have a moderating influence on the impact of career satisfaction on nurse service quality. Specifically, high levels of supervisor support could mitigate negative aspects of lower career satisfaction, maintaining a baseline of service quality and enhancing the positive impact as career satisfaction grows.

The non-linear relationship here implies that interventions to improve nurse service quality may need to consider more than just enhancing career satisfaction; they must also account for the level of supervisor support. This could mean that for healthcare

organizations, bolstering supervisor support could be just as crucial as improving other aspects of nurses' work environment to maintain and improve service quality.
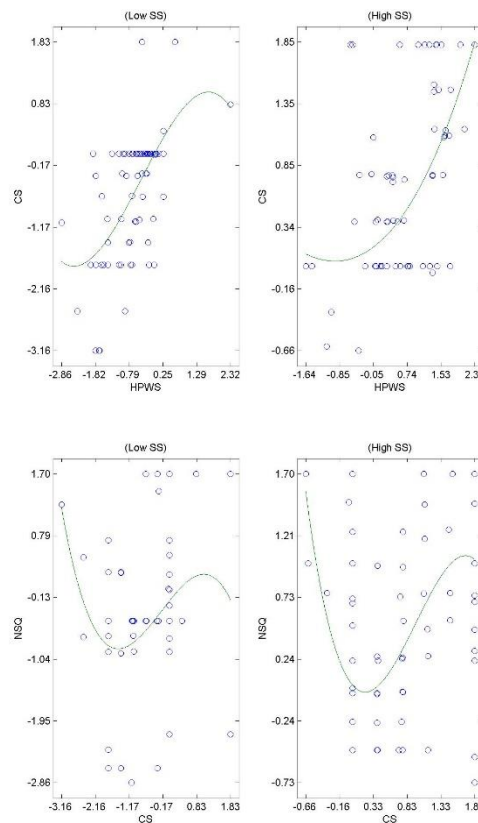

Figure 2. View two graphs with low-high values of moderating variable and data points.

Implications

The study's findings on the moderating role of supervisor support in the context of high-performance work systems (HPWS) and their effect on nurse service quality through career satisfaction have important implications for healthcare management and policy.

Leadership Development. Training programs that enhance leadership qualities in supervisors could be a key strategy. Effective leadership has the potential to amplify the benefits of HPWS on career satisfaction and, by extension, on service quality.

Strategic HRM. Human resources management (HRM) needs to consider both structural and relational elements to foster a conducive work environment. This includes the development of HPWS that are complemented by supportive supervisory practices.

Employee Engagement. Initiatives aimed at increasing career satisfaction among nurses should be a priority. Engaged employees are more likely to provide high-quality care, and this study underlines the pathway through which engagement can be achieved.

Organizational Culture. A supportive organizational culture is integral to the successful implementation of HPWS. The moderating effect of supervisor support suggests that the cultural context shapes the success of these systems

Limitations and Future Research

This study is not without its limitations. The authors suggest directions for further research to deepen and expand understanding of the relationships among HPWS, supervisor support, career satisfaction, and nurse service quality.

Cross-Sectional Design. The study's cross-sectional nature limits the ability to infer causality. Longitudinal designs would better track the changes over time and the enduring effects of HPWS and supervisor support.

Sample Diversity. The research might have limitations concerning the diversity of the sample. Including a broader demographic and different healthcare settings would enhance the generalizability of the findings.

Measurement of Constructs. The operationalization of constructs like career satisfaction and service quality may vary; thus, the measurement tools should be examined for cross-context validity.

Future Research

Expanding the Model. Future research could explore additional variables that might impact the primary relationships studied, such as job autonomy, team dynamics, and organizational justice.

Interventional Studies. Interventional studies that implement specific changes in supervisor support and measure the subsequent impact on HPWS effectiveness and service quality would provide a practical roadmap for improvements.

Cultural Contexts. Comparative studies across different cultural and healthcare contexts could reveal the extent to which cultural factors influence the moderating role of supervisor support.

Quantitative and Qualitative Methods. Combining quantitative data with qualitative insights could enrich the understanding of how and why supervisor support plays a critical role.

V. Conclusion

This study highlights the significant impact of High-Performance Work Systems (HPWS) and supervisory support on nurse service quality through the mediating role of career satisfaction. Our findings demonstrate that effective implementation of HPWS significantly enhances career satisfaction among nurses, which subsequently improves service quality. Moreover, the addition of supervisory support not only directly contributes to service quality but also amplifies the positive effects of HPWS on career satisfaction and indirectly on service quality. This dual pathway underscores the importance of supportive supervisory practices alongside structured performance systems in healthcare settings.

Acknowledgment

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Appendix A
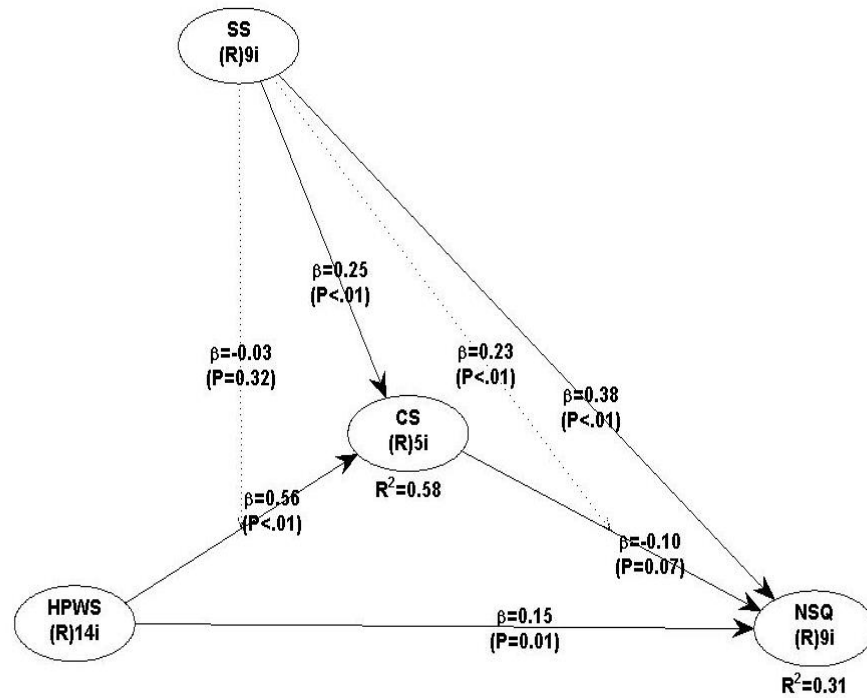
Figure 3. Measurement Model Evaluation Result[12][49][40]

Appendix B

Tabel 5. Latent Variables Coefficient (Average Variance Extracted)

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
R-squared			0.583	0.394		
Adj. R-squared			0.577	0.385		
Composite reliab.	0.946	0.942	0.944	0.959	1.000	1.000
Cronbach's alpha	0.938	0.930	0.926	0.951	1.000	1.000
Avg. var. extrac.	0.557	0.644	0.773	0.720	1.000	1.000
Full collin. VIF	3.355	2.815	2.681	1.542	2.653	2.832
Q-squared			0.602	0.396		
Min	-2.860	-2.261	-3.160	-2.865	-1.384	-3.020
Max	2.323	1.991	1.826	1.701	4.554	3.653
Median	-0.000	0.168	0.024	-0.368	-0.439	-0.524
Mode	0.259	0.171	0.024	-0.475	-0.571	-0.548
Skewness	0.227	0.084	-0.437	-0.176	1.979	1.691
Exc. kurtosis	0.250	-0.441	1.007	0.413	3.873	3.192
Unimodal-RS	Yes	Yes	Yes	Yes	Yes	Yes
Unimodal-KMV	Yes	Yes	Yes	Yes	Yes	Yes
Normal-JB	Yes	Yes	No	Yes	No	No
Normal-RJB	No	Yes	No	Yes	No	No
Histogram	View	View	View	View	View	View

Appendix C

Tabel 6. Path Coefficient (Structural Model/Inner Model)[49]

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	0.561	0.247			-0.032	
NSQ		0.467	0.156			0.226

P values for total effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	<0.001	<0.001			0.324	
NSQ		<0.001	0.012			<0.001

Appendix D

Tabel 7. Linear and nonlinear (warped) relationships among latent variables[50][4]

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
HPWS						
SS						
CS	Warped	Warped			Warped	
NSQ		Warped	Warped			Warped
SS*HPWS						
SS*CS						

Appendix   **E**

Tabel 8. Indirect and total effects[51][49][46][52][51]

Indirect effects for paths with 2 segments

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.087	0.038			-0.005	

Number of paths with 2 segments

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	1	1			1	

P values of indirect effects for paths with 2 segments

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.039	0.220			0.460	

Standard errors of indirect effects for paths with 2 segments

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.049	0.050			0.050	

Effect sizes of indirect effects for paths with 2 segments

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.044	0.021			0.001	

Sums of indirect effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.087	0.038			-0.005	

Number of paths for indirect effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	1	1			1	

P values for sums of indirect effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.039	0.220			0.460	

Standard errors for sums of indirect effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.049	0.050			0.050	

Effect sizes for sums of indirect effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
NSQ	0.044	0.021			0.001	

Total effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	0.561	0.247			-0.032	
NSQ	0.087	0.506	0.156		-0.005	0.226

Number of paths for total effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	1	1			1	
NSQ	1	2	1		1	1

P values for total effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	<0.001	<0.001			0.324	
NSQ	0.039	<0.001	0.012		0.460	<0.001

Standard errors for total effects

	HPWS	S	CS	NSQ	SS*HPWS	SS*CS
CS	0.063	0.067			0.070	
NSQ	0.049	0.064	0.069		0.050	0.068

Effect sizes for total effects

	HPWS	SS	CS	NSQ	SS*HPWS	SS*CS
CS	0.421	0.168			0.006	
NSQ	0.044	0.280	0.075		0.001	0.061