Journal of Management World **2025**, 2: 519-529
DOI: 10.53935/jomw.v2024i4.984

Enhancing Patient Management Effectiveness: The Roles of Transformational Leadership, Safety Culture, Employee Satisfaction, and Service Digitalization in the Digital Healthcare Era

Chamdan Purnama[1*], Mirhamida Rahmah[2], Dinda Fatmah[3], Yusriyah Rahmah[4], Zakiyah Zulfa Rahmah[5]

[1,2,3]Management Department, Faculty of Economics, School of Economics Al-Anwar, Mojokerto, 61361, Indonesia; chamdan.p@gmail.com (C.P.) mirhamidar@gmail.com (M.R.) fatmah.dinda@gmail.com (D.F.).
[4]Information Sistem Department, Faculty of Economics and Digital Business, University of Bina Sehat PPNI, Mojokerto, 61364, Indonesia; riyahyus@gmail.com (Y.R.).
[5]Shariah Economic Department, Faculty of Economics and Business, State Islamic Religious Institute, Kediri, 65145, Indonesia; zrahmah44@gmail.com (Z.Z.R.).

Abstract. The effectiveness of patient management in hospitals is influenced by transformational leadership, patient safety culture, and employee satisfaction. In the digital era, technology plays a crucial role in improving managerial efficiency. This study examines the relationship between these factors and patient management effectiveness, with service digitalization as a moderating variable. This study aims to analyze the influence of transformational leadership, patient safety culture, and employee satisfaction on patient management effectiveness while exploring the role of service digitalization as a moderator. An explanatory approach with a quantitative research design was used. Data were collected through a Likert-scale questionnaire from 207 employees of Dian Husada Hospital Mojokerto and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show that employee satisfaction positively affects patient management effectiveness, while patient safety culture has a negative influence. Transformational leadership positively impacts employee satisfaction but does not directly affect patient management effectiveness. Meanwhile, service digitalization does not show a significant moderating effect. These results suggest that hospitals should focus on improving employee satisfaction and managing safety culture effectively. Strengthening transformational leadership is essential to creating a supportive work environment, while optimizing service digitalization can enhance employee performance. This study fills a gap in the literature on factors influencing patient management effectiveness and the role of digitalization in hospital settings. However, its cross-sectional design and limited hospital sample restrict generalizability. Future studies should use longitudinal approaches with broader samples for better external validity.

Keywords: Employee Satisfaction, Patient Management Effectiveness, Patient Safety Culture, Service Digitalization, Transformational Leadership.

1. INTRODUCTION

Hospitals are crucial healthcare institutions, strategically positioned to improve public health through the provision of quality healthcare services. They fulfill a vital role in delivering comprehensive inpatient, outpatient, and emergency care (Irawan et al., 2024) and (Amran et al., 2022). To meet their objectives, hospitals must effectively manage human resources, technologies, and systems that underpin patient management processes. These processes, both administrative and clinical, ensure timely, accurate, and high-quality services to patients (Duvald et al., 2025). Among the factors influencing the efficiency and quality of these processes, transformational leadership has emerged as a pivotal element. Transformational leaders provide vision, motivation, and inspiration, fostering a culture that prioritizes safety and continuous improvement, ultimately enhancing the quality of care (Jo & Shin, 2025) and (Onişor, 2015).

A strong patient safety culture complements transformational leadership in driving hospital effectiveness. Patient safety culture reflects the institution's commitment to minimizing risks, preventing medical errors, and managing incidents proactively. Studies have shown that a robust safety culture can foster open communication, improve trust, and reduce errors, thereby improving healthcare outcomes and patient satisfaction (Catania et al., 2021) and (Nurprilinda et al., 2021).

In the digital era, healthcare technology integration plays an instrumental role in improving service delivery. Digitalization strategies such as electronic medical records (EMR), online patient registration systems, and advanced data management solutions are increasingly vital. These technologies reduce wait times, enhance data accuracy, and streamline coordination among departments. Research by (Hustad & Olsen, 2021) highlights that digital systems can amplify the positive impact of transformational leadership and patient safety culture on patient management effectiveness.

Employee satisfaction is another critical variable in optimizing patient management. Healthcare workers who are content with their working conditions, supported by effective leadership and technology, are more likely to exhibit high productivity and commitment to quality service (Wiljer & Hakim, 2019). Satisfied employees contribute to fostering a patient-centered culture, enhancing both safety and service quality (Soyer Er & Gül, 2024). Therefore, employee satisfaction serves as a mediating factor linking transformational leadership, patient safety culture, and effective patient management.

Dian Husada Hospital, a prominent healthcare provider in Indonesia, exemplifies the challenges hospitals face in enhancing service quality. Surveys through suggestion boxes and online reviews revealed several complaints,

* Correspondence: chamdan.p@gmail.com

including non-informative communication, long wait times, and cleanliness issues. These challenges underscore the need for effective management approaches rooted in transformational leadership, patient safety culture, and digitalization to improve patient management outcomes.

This research aims to address gaps in existing literature by exploring the synergistic relationship between transformational leadership, patient safety culture, employee satisfaction, and service digitalization. While prior studies (Kola Olayiwola et al., 2024) and (Catania et al., 2021) emphasized the importance of effective communication and wait-time management, they did not adequately incorporate the role of transformational leadership or digitalization. Similarly, research by (Ogbonnaya et al., 2023) and (Nurprilinda et al., 2021) highlighted service quality dimensions like reliability and responsiveness but overlooked the mediating role of employee satisfaction. This study seeks to integrate these factors into a cohesive model, offering practical recommendations for improving patient management effectiveness in Indonesian hospitals.

1.1. Hypothesis Development

H_1: Transformational leadership has a positive and significant effect on employee satisfaction. (Saputro, 2021) found that transformational leadership style enhances job satisfaction.

H_2: Patient safety culture has a positive and significant effect on employee satisfaction. The study by (Jacobus et al., 2022) shows that a strong safety culture increases employees' sense of security and job satisfaction.

H_3: Transformational leadership has a positive and significant effect on employee satisfaction. The study by (Tintami et al., 2012) indicates that transformational leadership influences employee job satisfaction.

H_4: Patient safety culture has a positive and significant effect on employee satisfaction. The study by (Arini, 2018) found that a strong safety culture, where all safety procedures and protocols are properly implemented, enhances employee satisfaction.

H_5: Employee satisfaction has a positive and significant effect on patient management effectiveness. The study by (Pawerangi et al., 2023) indicates that satisfied employees tend to provide more effective services.

H_6: Service digitalization has a positive and significant effect on patient management effectiveness. A study by Awaluddin, A. (2023) suggests that digital transformation has emerged as a key element in creating inclusive and effective technology-based services.

H_7: Transformational leadership has a positive and significant effect on patient management effectiveness, with employee satisfaction as an intervening variable. The study by (Winarto & Purba, 2018) shows that transformational leadership significantly influences service effectiveness, mediated by employee satisfaction levels.

H_8: Patient safety culture has a positive and significant effect on patient management effectiveness, with employee satisfaction as an intervening variable. The study by (Dianvayani et al., 2024) suggests that a strong safety culture enhances employee satisfaction, which indirectly contributes to management effectiveness.

H_9: Service digitalization positively and significantly moderates the relationship between transformational leadership and patient management effectiveness. According to Gading et al. (2024), service digitalization, such as the implementation of technology-based information systems, strengthens the relationship between visionary leadership and improved service effectiveness.

H_{10}: Service digitalization positively and significantly moderates the relationship between patient safety culture and patient management effectiveness. The study by Savira, A. (2022) found that digitalization enhances the impact of safety culture on time management and service quality, particularly through more efficient data management. Figure 1. Conceptual Framework.

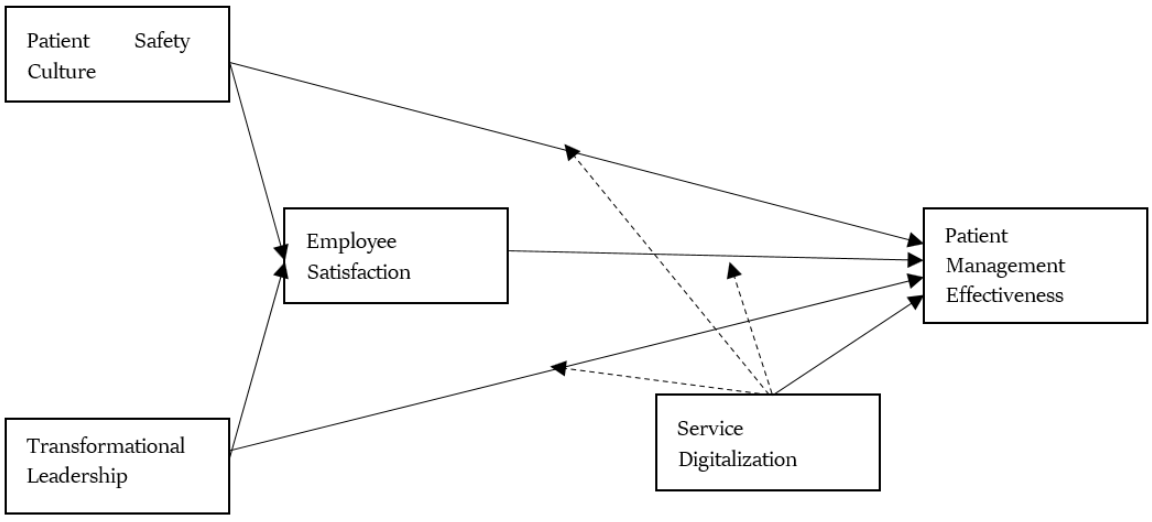

Figure 1.
Conceptual Framework.

2. METHODOLOGY

2.1. Research Design

This study employs an explanatory approach to analyze the relationships between transformational leadership, patient safety culture, employee satisfaction, and patient management effectiveness, with service digitalization as a moderating variable. The hypothesis testing approach facilitates the exploration of direct and indirect relationships among these variables, offering insights into how leadership and safety culture influence patient management in hospitals.

A cross-sectional design is used, deemed appropriate for the exploratory nature of this research and resource limitations. As supported by (Harrison et al., 2020), cross-sectional studies map relationships between variables at a specific point in time. This design allows a quick analysis of current conditions without the time and resource demands of longitudinal research (Gomm, 2008). However, the limitations of this design in capturing long-term dynamics are acknowledged. Future research is recommended to adopt longitudinal methods for understanding changes in these relationships over time.

2.2. Sampling Strategy

The study was conducted at Dian Husada Hospital in Indonesia using a total sampling technique, including all 207 employees as respondents. This comprehensive approach ensured that the perspectives of both medical and non-medical staff contributing to patient management were captured. The use of total sampling increased data representativeness and minimized potential biases compared to smaller sample sizes.

Total sampling aligns well with the Partial Least Squares Structural Equation Modeling (PLS-SEM) method, which allows complex model testing even with smaller sample sizes (Hair et al., 2014). The study's focus on a single hospital enables an in-depth exploration of the relationships between transformational leadership, patient safety culture, employee satisfaction, and patient management effectiveness, including the moderating role of service digitalization. Future research could expand to multiple hospitals to enhance generalizability.

2.3. Data Collection

Data collection took place from November to December 2024 at Dian Husada Hospital in Indonesia using Likert scale-based questionnaires. The indicators were developed based on prior literature: transformational leadership (Riggio & Mhatre, 2014), patient safety culture (Alrasheeday et al., 2025), employee satisfaction (Edmans, 2011), patient management effectiveness (Taloba & Matoog, 2025), and service digitalization (Hair et al., 2019).

Challenges such as respondents' busy schedules were mitigated by flexible questionnaire and interview arrangements (Harrison et al., 2020). A pilot test ensured clarity and validity of questionnaire items (Gomm, 2008).

2.4. Data Analysis Techniques

Data were analyzed using PLS-SEM, suitable for complex models, small sample sizes, and non-normal distributions (Sarstedt et al., 2020). The measurement model was assessed for validity and reliability, while the structural model evaluated relationships between variables using bootstrapping techniques. This robust framework provides insights into how leadership, safety culture, and digitalization affect patient management, offering practical recommendations for improving hospital performance.

3. RESULTS

3.1. Measurement Model Assessments

Based on Table 2, the results of the measurement model assessment indicate that all variables in this study meet the criteria for convergent validity and reliability. The Average Variance Extracted (AVE) values for all variables are greater than 0.50, indicating that each variable explains more than 50% of the variance in its indicators. Additionally, the Cronbach's Alpha and Composite Reliability (CR) values for each variable exceed 0.70, demonstrating good internal consistency in the measurements.

Table 1: Measurement Model Testing Convergent Validity, Composite Reliability and Cronbach's Alpha.

Variable	λ	Cronbach's α	rho_A	CR	AVE
Transformational Leadership (TL)		0.924	0.928	0.942	0.766
TL1	0.757				
TL2	0.919				
TL3	0.925				
TL4	0.878				
TL5	0.841				
Patient Safety Culture (PS)		0.957	0.986	0.966	0.850
PS1	0.953				
PS2	0.871				
PS3	0.908				
PS4	0.944				
PS5	0.941				
Employee Satisfaction (ES)		0.915	0.923	0.937	0.750
ES1	0.862				
ES2	0.884				
ES3	0.912				
ES4	0.879				
ES5	0.838				
Service Digitalization (SD)		0.985	0.985	0.988	0.942
SD1	0.971				
SD2	0.978				
SD3	0.971				
SD4	0.981				
SD5	0.951				
Patient Management Effectiveness (PM)		0.929	0.930	0.947	0.780
PM1	0.918				
PM2	0.883				
PM3	0.835				
PM4	0.930				
PM5	0.845				
Moderating SD & TL	0.832	1.000	1.000	1.000	1.000
Moderating SD & PS	0.942	1.000	1.000	1.000	1.000
Moderating SD & ES	0.928	1.000	1.000	1.000	1.000

The results of the convergent validity, composite reliability, and Cronbach's Alpha tests in Table 1 show that all constructs in the study exhibit excellent measurement quality. All Cronbach's Alpha and Composite Reliability (CR) values are above the 0.7 threshold, indicating very good reliability for all constructs, namely TL (Transformational Leadership), PS (Patient Safety Culture), ES (Employee Satisfaction), SD (Service Digitalization), and PM (Patient Management). Additionally, the Average Variance Extracted (AVE) values for all constructs exceed 0.5, indicating that convergent validity is met. This means that each construct explains most of the variance of its indicators.

Each indicator has a factor loading (λ) value above 0.7, indicating that the indicators are valid in measuring the constructs they represent. Specifically, the SD construct has the highest reliability and validity with a CR value of 0.988 and an AVE of 0.942, showing that the variance of the construct is almost entirely explained by its indicators. For the moderation aspects (SD & TL, SD & PS, and SD & ES), the reliability and validity values reach the maximum (1.000), emphasizing a very strong relationship in the model. Therefore, all research instruments meet the necessary validity and reliability criteria for further analysis

Table 2: Discriminant Validity

Variable	ES	Moderating SD*ES	Moderating SD*PS	Moderating SD*TL	PM	PS
Fornell-Larcker Criterion						
ES	0.875					
Moderating SD*ES	-0.150	1.000				
Moderating SD*PS	-0.199	0.655	1.000			
Moderating SD*TL	-0.033	0.799	0.170	1.000		
PM	0.857	-0.187	-0.134	-0.138	0.883	
PS	0.463	-0.202	-0.185	-0.091	0.122	
SD	0.969	-0.130	-0.174	-0.017	0.870	
TL	0.781	-0.030	-0.080	0.038	0.858	0.888
Heterotrait-Monotrait Ratio (HTMT)						
ES						
Moderating SD*ES	0.160					
Moderating SD*PS	0.209	0.655				
Moderating SD*TL	0.078	0.799	0.170			
PM	0.823	0.195	0.140	0.143		
PS	0.498	0.207	0.190	0.091	0.184	
SD	0.817	0.131	0.176	0.020	0.810	
TL	0.841	0.056	0.088	0.062	0.823	

3.2. Discriminant Validity

The results of the discriminant validity analysis in Table 2 show that the research instruments possess good discriminant validity based on two evaluation methods: the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT).

In the Fornell-Larcker method, the square root of the Average Variance Extracted (AVE) values (shown on the diagonal of the table) is greater than the correlations between constructs. For example, the square root of the AVE for ES (0.875) is higher than its correlation with PS (0.463) and PM (0.857). Similarly, the square root of the AVE for other constructs, such as PM (0.883) and PS (0.888), also meets this criterion, indicating that each construct can be empirically distinguished.

Additionally, the HTMT method shows that the ratio between constructs is below the threshold of 0.85, such as the HTMT value between ES and PM (0.823) or ES and PS (0.498). This confirms that discriminant validity is achieved, as there are no excessive cross-construct correlations. Overall, these results indicate that the constructs used in the study are unique and reliable for measuring different concepts, thus supporting the accuracy of further analysis.

3.3. Structural Model Testing Results

Test the Inner Model. Structural models focus on hypothesized relationships or paths between variables. The results of the inner model testing can be seen in Figure 2.

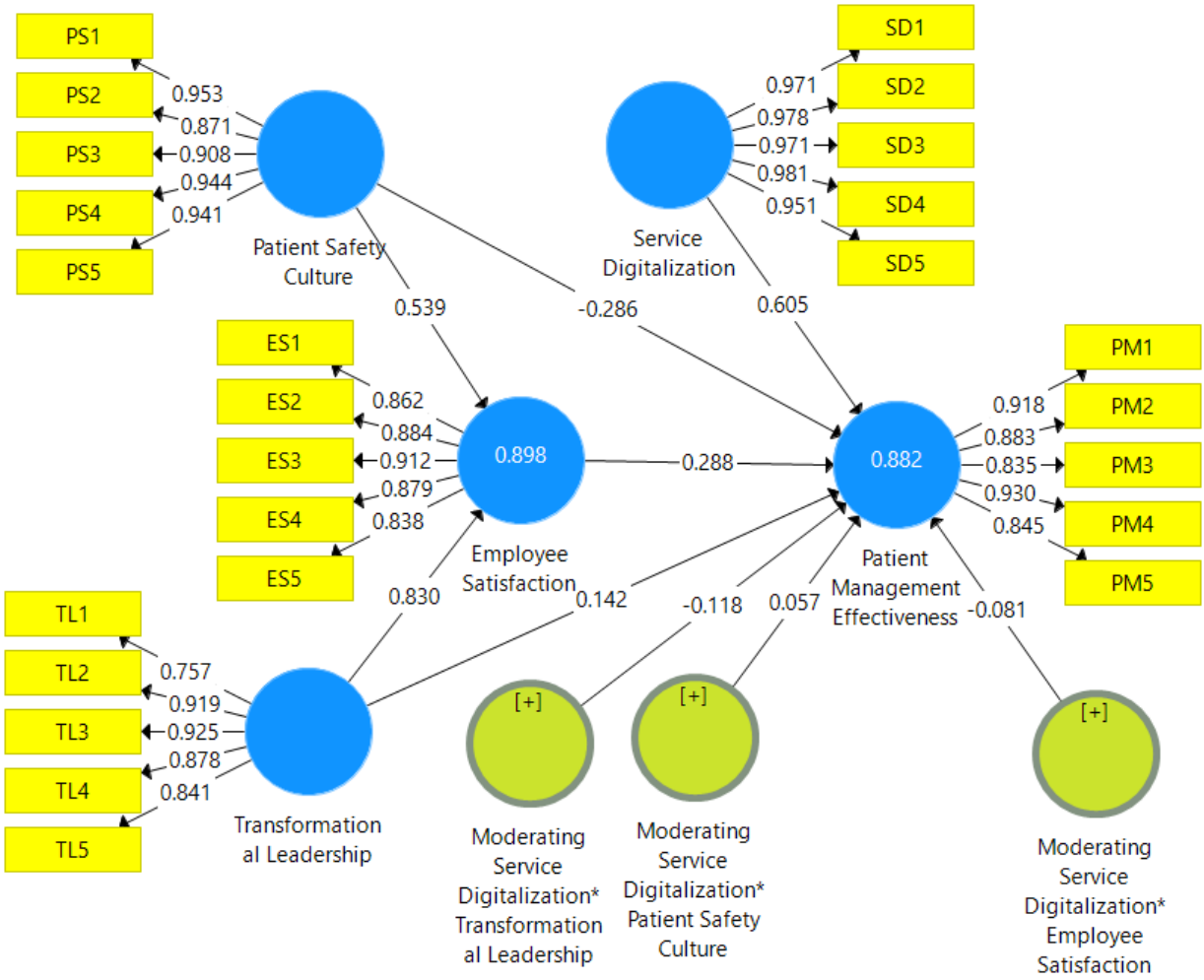

Figure 2: Structural Model.

Based on Figure 2, the analysis confirms good measurement validity, with all factor loadings above 0.7, such as TL3 (0.925) and PS1 (0.953), which strongly represent their constructs. TL significantly affects ES (coefficient 0.830), while ES positively impacts PM (coefficient 0.288). SD directly influences PM (coefficient 0.605), highlighting its critical role. Additionally, PS significantly impacts PM (coefficient 0.539), reinforcing its importance in management effectiveness. SD moderates relationships such as TL-PM, PS-PM, and ES-PM, enhancing their effects. The R^2 values (0.898 for ES and 0.882 for PM) indicate a strong explanatory model.

3.4. Hypothesis Testing Results

The results of hypothesis testing in Table 3

Table 3: Hypothesis Testing.

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
Direct Effects						
ES -> PM	0.288	0.285	0.117	2.453	0.014	Significant
PS -> ES	0.539	0.538	0.033	16.171	0.000	Significant
PS -> PM	-0.286	-0.283	0.051	5.638	0.000	Significant
SD -> PM	0.605	0.606	0.103	5.870	0.000	Significant
TL -> ES	0.830	0.829	0.031	26.452	0.000	Significant
TL -> PM	0.142	0.146	0.075	1.911	0.056	Not Significant
Indirect Effects (Mediating)						
PS -> ES -> PM	0.155	0.153	0.064	2.436	0.015	Significant
TL -> ES -> PM	0.239	0.236	0.097	2.474	0.013	Significant
Effects Moderating						
Moderating SD*ES -> PM	-0.125	-0.147	0.091	1.369	0.171	Not Significant
Moderating SD*PS -> PM	0.056	0.039	0.059	0.952	0.341	Not Significant
Moderating SD*TL -> PM	-0.074	-0.047	0.109	0.680	0.497	Not Significant

Based on the hypothesis testing results in Table 3, several significant relationships were identified. First, ES positively influences PM with a coefficient of 0.288 (p = 0.014, T = 2.453), confirming that higher employee satisfaction leads to improved patient management. A strong PS also has a significant positive effect on employee satisfaction (coefficient 0.539, p = 0.000, T = 16.171), suggesting that a safety-focused work environment enhances employee well-being. However, the direct effect of PS on PM was found to be negative (coefficient -0.286, p = 0.000, T = 5.638), indicating that excessive focus on safety may reduce management effectiveness, potentially due to other factors.

SD showed a positive effect on PM (coefficient 0.605, p = 0.000, T = 5.870), indicating that digital tools improve patient management. TL significantly enhances ES (coefficient 0.830, p = 0.000, T = 26.452), but its direct impact on PM was not significant (coefficient 0.142, p = 0.056, T = 1.911), suggesting its effect on PM is mediated by ES.

Indirect effects show that PS and TL influence PM through ES, confirming its mediating role. However, the moderation effect of SD on these relationships was not significant, with p-values > 0.05.

Overall, these results emphasize the importance of transformational leadership in enhancing employee satisfaction, which in turn contributes to the improvement of patient management effectiveness, as well as the direct role of service digitalization in supporting patient management effectiveness.

Table 4: Presents the outcomes for Koefisien Determinasi (R^2) and Relevansi Prediktif (Q^2)

Variabel	R^2	Q^2
ES	0.898	0.895
PM	0.882	0.865

Based on Table 4, the analysis of the Coefficient of Determination (R^2) and Predictive Relevance (Q^2) shows that the research model has excellent explanatory and predictive capabilities. The R^2 value for the ES variable is 0.898, meaning that the independent variables in the model, such as TL, can explain 89.8% of the variance in ES. Similarly, the R^2 value for PM is 0.882, indicating that variables such as ES, SD, and PS explain 88.2% of the variance in PM.

Additionally, the Q^2 values for ES (0.895) and PM (0.865) demonstrate that this model not only explains the variance in the dependent variables but also has very strong predictive relevance. The Q^2 values close to the R^2 values indicate that the model can predict observation values accurately. Overall, the combination of high R^2 and Q^2 values proves that this research model is of high quality and effective in explaining the relationships between variables as well as predicting outcomes

Table 5: Presents the outcomes for f Square (f^2).

Variable	ES	Moderating SD*ES	Moderating SD*PS	Moderating SD*TL	PM	PS	SD	TL
ES					0.030			
Moderating SD*ES					0.004			
Moderating SD*PS					0.005			
Moderating SD*TL					0.011			
PM								
PS	2.810				0.172			
SD					0.181			
TL	6.675				0.021			

Table 5 shows the results of the f-Square (f^2) analysis, which indicates the contribution of each independent variable to the dependent variables in the research model. The TL variable has a very large effect on ES with an f^2 value of 6.675, suggesting that TL plays a key role in improving ES.

For the PM variable, the largest contributions come from SD (f^2 = 0.181) and PS (f^2 = 0.172), indicating that service digitalization and patient safety culture are important factors in enhancing patient management effectiveness. Meanwhile, the ES variable has a small effect on PM (f^2 = 0.030), and TL also contributes minimally to PM (f^2 = 0.021).

The moderating role of SD on the relationships between ES, PS, and TL with PM has very small to small f^2 values (ranging from 0.004 to 0.011), indicating that the moderating effect of SD is not significant in this model. Overall, these results emphasize the importance of TL, PS, and SD in fostering ES and improving PM.

4. DISCUSSION

4.1. Direct Effects

The study highlights significant relationships between employee satisfaction, patient safety culture, transformational leadership, and patient management effectiveness. Employee satisfaction was found to positively impact patient management effectiveness, consistent with (Alsalem et al., 2023) and (Chang et al., 2012), who emphasize that satisfied employees deliver higher-quality service. Patient safety culture also positively influenced employee satisfaction, aligning with (Bonus et al., 2025), who found that a safety-focused environment fosters

well-being. However, an unexpected finding was the negative impact of patient safety culture on patient management effectiveness. This suggests that excessive focus on safety procedures, without adequate support, may increase employee stress, reducing efficiency a phenomenon noted by (Duijkers et al., 2024).

Service digitalization positively affected patient management effectiveness, affirming (Kruse et al., 2022), who highlight the role of technology in enhancing clinical decision-making and operational outcomes. Transformational leadership directly improved employee satisfaction, supporting (Luthans et al., 2007) and (Younis et al., 2024). However, its direct impact on patient management effectiveness was insignificant, indicating its influence is primarily indirect, mediated through employee satisfaction, as suggested by (Windlinger et al., 2025).

The findings emphasize the need for hospitals to focus on leadership development, balanced safety culture, and digital technology adoption. These strategies collectively enhance employee satisfaction and patient management effectiveness, optimizing healthcare outcomes.

4.2. Indirect Effects (Mediating)

The study also found that patient safety culture influences patient management effectiveness through employee satisfaction. This reinforces the idea that a safe work environment enhances employee well-being, which motivates them to work more efficiently, thus improving patient management outcomes. This result aligns with (Prentice et al., 2024) and (DiCuccio, 2018), who showed that a safe environment positively affects service quality by enhancing employee satisfaction.

Similarly, the mediating effect of employee satisfaction was evident in the relationship between transformational leadership and patient management effectiveness. Transformational leadership enhances employee satisfaction, which then boosts productivity and organizational efficiency, as noted by (Lee Kah Yan et al., 2024) and (Luthans et al., 2007). Furthermore, (Khan et al., 2021) found that transformational leadership significantly impacts organizational outcomes by improving employee motivation and well-being. Thus, employee satisfaction plays a crucial role in bridging leadership and management effectiveness.

4.3. Effects Moderating

The moderating effect of service digitalization was not significant in this study, as indicated by non-significant p-values for the moderating relationships. This suggests that service digitalization did not significantly strengthen or weaken the relationships between employee satisfaction, patient safety culture, transformational leadership, and patient management effectiveness. Several factors may explain this result. First, the uneven adoption of technology within healthcare organizations may limit its effectiveness. (Ferreira et al., 2024) argue that immature digitalization often fails to impact organizational performance due to poor integration with existing systems.

Additionally, the interpersonal nature of healthcare and the importance of leadership and safety culture may outweigh the direct influence of technology on management effectiveness. (Kadir & Broberg, 2020) suggest that while technology enhances efficiency, emotional and motivational factors, such as leadership and safety culture, remain more critical in improving effectiveness. The complexity of healthcare technology, including the steep learning curves and resistance to change, could also reduce its impact (Alnemer et al., 2022).

However, some studies, such as (Chaudhuri et al., 2024) and (O'Kane et al., 2024), suggest that when digitalization directly supports employees, it can enhance relationships between employee satisfaction and organizational outcomes. To strengthen the moderating effect of service digitalization, healthcare organizations must optimize technology integration into work processes, provide adequate training, and create an environment where technology supports human interaction. Digitalization alone is not enough; its success relies on how it is applied within the existing organizational context.

4.4. Research Implications

4.4.1. Theoretical Implications

This research significantly contributes to the development of theories in hospital management and healthcare services, particularly concerning transformational leadership, patient safety culture, employee satisfaction, and patient management effectiveness. The findings strengthen several key theories while providing new insights into the relationship between digital technology and managerial effectiveness.

First, the study supports transformational leadership theory (Monje-Amor et al., 2020) and (Luthans et al., 2007), which emphasizes that leaders who inspire and empower employees create a supportive environment, boosting motivation and job satisfaction. This study reinforces the notion that transformational leaders enhance employee satisfaction through clear communication and recognition, contributing to improved organizational effectiveness (Jo & Shin, 2025) and (Luthans et al., 2007).

Second, the research upholds the organizational culture theory, specifically the connection between a strong patient safety culture and employee satisfaction (Sexton et al., 2021) and (Schein, 1990). This study confirms that a robust safety culture not only improves health outcomes but also enhances employee engagement, which directly impacts service quality and patient management.

Furthermore, the research highlights the significant role of employee satisfaction in improving patient management effectiveness, in line with the two-factor motivation theory (Rehman Khan et al., 2022) and (Suthatorn & Charoensukmongkol, 2023). Satisfied employees are more likely to deliver high-quality care and contribute to positive healthcare outcomes (Yaqoob et al., 2024) and (Alsalem et al., 2023).

Although service digitalization did not significantly moderate the relationships in this study, the findings align with organizational technology theory (Ghaleb et al., 2021) and (Kulkarni et al., 2024), emphasizing that technology's success in healthcare relies on its integration with human work processes. (Aswin Rahadi et al., 2021) argue that technology must support employees directly to improve organizational outcomes.

Finally, the study enriches social systems theory in healthcare (Apascaritei & Elvira, 2022) and (Etemad et al., 2001), illustrating that the interplay between leadership, safety culture, and employee satisfaction shapes patient management effectiveness. The findings suggest that while technology is a key factor, its success depends on human elements and organizational culture, providing a more nuanced understanding of service digitalization's role in healthcare.

4.4.2. Managerial Implications

The findings of this study provide several practical implications for hospital managers and stakeholders in the healthcare sector. First, it is crucial for managers to focus on enhancing employee satisfaction, which has been shown to have a positive impact on patient management effectiveness. Managers can improve employee satisfaction through the development of transformational leadership that inspires and empowers employees to achieve organizational goals. Additionally, patient safety culture should be continually reinforced to create a supportive work environment where employees feel safe and valued.

On the other hand, while service digitalization has the potential to improve patient management effectiveness, the results of this study suggest that technology must be well-integrated into work processes and supported by adequate training. Managers should ensure that technology does not replace human interaction but instead supports and accelerates work processes, which in turn can enhance employee satisfaction and patient management effectiveness.

5. CONCLUSIONS

This study demonstrates that employee satisfaction, patient safety culture, and transformational leadership have a significant direct impact on patient management effectiveness, with employee satisfaction acting as an important mediator. Although service digitalization shows potential to improve patient management effectiveness, the moderating effect of digitalization was not found to be significant in this study. These findings emphasize the importance of creating a supportive work environment, with employee well-being and inspirational leadership as key factors in improving hospital performance in the modern era.

This study is limited by its cross-sectional design, which captures relationships at a single point in time, and its focus on one hospital, restricting generalizability. The reliance on Likert scale-based questionnaires may introduce response bias. Future research should adopt longitudinal designs to explore variable dynamics over time and include multiple hospitals with diverse characteristics to improve external validity. Additionally, further investigation into service digitalization's role should consider factors such as technology readiness, employee training, and barriers to technology adoption.

Acknowledgements

The author would like to thank all parties who have provided support and contributions to this research.

REFERENCES

Alnemer, R., Alnaseeb, A., Belal, L., Balhareth, G., Altuwayjiri, A., Alsannat, I., Alotaibi, A., & Alagi, A. (2022). The Role of Medical Technology in Improving Healthcare Quality: A Critical Review. *EPH - International Journal of Medical and Health Science*, *8*(3), 1–9. https://doi.org/10.53555/eijmhs.v8i3.233

Alrasheeday, A. M., Alkubati, S. A., Alqalah, T. A. H., Alrubaiee, G. G., Alshammari, B., Almazan, J. U., Abdullah, S. O., & Loutfy, A. (2025). Nursing students' perceptions of patient safety culture and barriers to reporting medication errors: A cross-sectional study. *Nurse Education Today*, *146*(November 2024), 106539. https://doi.org/10.1016/j.nedt.2024.106539

Alsalem, N., Rashid, F. A., Aljarudi, S., Al Bazroun, M. I., Almatrouk, R. M., Alharbi, F. M., Al Mansour, L., & Abuzaid, N. B. (2023). Exploring Missed Nursing Care in the NICU: Perspectives of NICU Nurses in Saudi Arabia's Eastern Health Cluster. *Pediatric Reports*, *15*(4), 571–581. https://doi.org/10.3390/pediatric15040052

Amran, M., Makul, N., Fediuk, R., Borovkov, A., Ali, M., & Zeyad, A. M. (2022). A Review on Building Design as a Biomedical System for Preventing COVID-19 Pandemic. *Buildings*, *12*(5). https://doi.org/10.3390/buildings12050582

Apascaritei, P., & Elvira, M. M. (2022). Dynamizing human resources: An integrative review of SHRM and dynamic capabilities research. *Human Resource Management Review*, *32*(4), 100878. https://doi.org/10.1016/j.hrmr.2021.100878

Arini, T. (2018). Budaya Keselamatan Pasien Berbasis Pemberdayaan Struktural Dengan Kepuasan Kerja Perawat. *Tesis*, 83–100.

Aswin Rahadi, R., Kusuma Dewi, E., Maya Damayanti, S., Fajar Afgani, K., Murtaqi, I., & Rahmawati, D. (2021). Adoption Analysis of Online Mutual Fund Investment Platform for Millennials in Indonesia. *Review of Integrative Business & Economics Research*, *10*(1), 74–81.

Bonus, C. G., Hatcher, D., Northall, T., & Montayre, J. (2025). Enhancing culturally responsive care in perioperative settings for older adult patients: A qualitative interview study. *International Journal of Nursing Studies*, *161*(September 2024), 104925. https://doi.org/10.1016/j.ijnurstu.2024.104925

Catania, G., Zanini, M., Signori, A., Dal Molin, A., Pilastri, P., Bottino, M., Cervetti, C., Aleo, G., Sasso, L., Bagnasco, A., Brunelli, D., Callura, G., Calzolari, M., La Placa, S., Lo Re, E., Pettinati, F., Piana, A., Regaldo, M., Henriquet, F., … Massidda, I. (2021). Providing a nurse-led complex nursing INtervention FOcused on quality of life assessment on advanced cancer patients: The INFO-QoL pilot trial. *European Journal of Oncology Nursing*, *52*(April). https://doi.org/10.1016/j.ejon.2021.101961

Chang, C. S., Chen, S. Y., & Lan, Y. T. (2012). Motivating medical information system performance by system quality, service quality, and job satisfaction for evidence-based practice. *BMC Medical Informatics and Decision Making*, *12*(1). https://doi.org/10.1186/1472-6947-12-135

Chaudhuri, R., Chatterjee, S., Vrontis, D., & Thrassou, A. (2024). Adoption of robust business analytics for product innovation and organizational performance: the mediating role of organizational data-driven culture. *Annals of Operations Research*, *339*(3), 1757–1791. https://doi.org/10.1007/s10479-021-04407-3

Dianvayani, G., Aripin, Z., Syahidin, R., Sofia, E., & Asnar, M. (2024). *Analisis Mutu Pelayanan Melalui Keselamatan Pasien Dan Kepuasan Pasien Sebagai Variabel Intervening (Studi Survei di Rumah Sakit Mitra Husada Pringsewu-Lampung)*. *4*, 11667–11686.

DiCuccio, M. (2018). The Relationship between Perceptions of Patient Safety Culture, Nurse Advocacy, and Nurse Sensitive Patient Outcomes. *Relationship Between Perceptions Of Patient Safety Culture, Nurse Advocacy & Nurse Sensitive Patient Outcomes*, 1. https://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=131796620&site=ehost-live

Duijkers, R., Prins, H. J., Kross, M., Snijders, D., van den Berg, J. W. K., Werkman, G. M., van der Veen, N., Schoorl, M., Bonten, M. J. M., van Werkhoven, C. H., & Boersma, W. G. (2024). Biomarker guided antibiotic stewardship in community acquired pneumonia: A randomized controlled trial. *PLoS ONE*, *19*(8), 1–15. https://doi.org/10.1371/journal.pone.0307193

Duvald, I., Lohse, C., Kirkegaard, H., & Burton, R. M. (2025). *Social Science & Medicine Organizational resilience in emergency healthcare : Lessons from the COVID-19 pandemic in five Danish hospitals*. *366*(August 2024). https://doi.org/10.1016/j.socscimed.2025.117728

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, *101*(3), 621–640. https://doi.org/10.1016/j.jfineco.2011.03.021

Etemad, H., Wright, R. W., & Dana, L. P. (2001). *Symbiotic international business networks : Collaboration between small and la ...*

Ferreira, J. J., Cruz, B., Veiga, P. M., & Ribeiro-Soriano, D. (2024). Knowledge strategies and digital technologies maturity: effects on small business performance. *Entrepreneurship and Regional Development*, *36*(1–2), 36–54. https://doi.org/10.1080/08985626.2022.2159544

Ghaleb, E. A. A., Dominic, P. D. D., Fati, S. M., Muneer, A., & Ali, R. F. (2021). The assessment of big data adoption readiness with a technology–organization–environment framework: A perspective towards healthcare employees. *Sustainability (Switzerland)*, *13*(15). https://doi.org/10.3390/su13158379

Gomm, R. (2008). Social Research Methodology. *Social Research Methodology*. https://doi.org/10.1007/978-0-230-22911-2

Hair, J. F., Babin, B. J., Black, W. C., & Anderson, R. E. (2019). *Multivariate Data Analysis*. Cengage. https://books.google.co.id/books?id=0R9ZswEACAAJ

Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Harrison, R. L., Reilly, T. M., & Creswell, J. W. (2020). Methodological Rigor in Mixed Methods: An Application in Management Studies. *Journal of Mixed Methods Research*, *14*(4), 473–495. https://doi.org/10.1177/1558689819900585

Hustad, E., & Olsen, D. H. (2021). Creating a sustainable digital infrastructure: The role of service-oriented architecture. *Procedia Computer Science*, *181*(2019), 597–604. https://doi.org/10.1016/j.procs.2021.01.210

Irawan, Y. H., Rostikarina, N. A., & Rahmawati, Y. (2024). Kajian Literatur Pengelolaan Obat Di Rumah Sakit. *ASSYIFA : Jurnal Ilmu Kesehatan*, *2*(2), 336–342. https://doi.org/10.62085/ajk.v2i2.100

Jacobus, D. W. C., Setyaningsih, Y., & Arso, S. P. (2022). Analisis Pengaruh Budaya Keselamatan Pasien, Budaya Organisasi, Dan Lingkungan Yang Mendukung Terhadap Motivasi Melaporkan Insiden Keselamatan Pasien-Systematic Riview. *An-Nadaa Jurnal Kesehatan Masyarakat*, *9*(2), 157. https://doi.org/10.31602/ann.v9i2.6842

Jo, H., & Shin, D. (2025). The impact of recognition, fairness, and leadership on employee outcomes: A large-scale multi-group analysis. *PLoS ONE*, *20*(1), 1–25. https://doi.org/10.1371/journal.pone.0312951

Kadir, B. A., & Broberg, O. (2020). Human well-being and system performance in the transition to industry 4.0. *International Journal of Industrial Ergonomics*, *76*, 0–45. https://doi.org/10.1016/j.ergon.2020.102936

Khan, A., Chen, L. R., & Hung, C. Y. (2021). The role of corporate social responsibility in supporting second-order social capital and sustainable innovation ambidexterity. *Sustainability (Switzerland)*, *13*(13). https://doi.org/10.3390/su13136994

Kola Olayiwola, R., Tuomi, V., Strid, J., & Nahan-Suomela, R. (2024). Impact of Total quality management on cleaning companies in Finland: A Focus on organisational performance and customer satisfaction. *Cleaner Logistics and Supply Chain*, *10*(January). https://doi.org/10.1016/j.clscn.2024.100139

Kruse, C. S., Betancourt, J. A., Madrid, S., Lindsey, C. W., & Wall, V. (2022). Leveraging mHealth and Wearable Sensors to Manage Alcohol Use Disorders: A Systematic Literature Review. *Healthcare (Switzerland)*, *10*(9). https://doi.org/10.3390/healthcare10091672

Kulkarni, A. V., Joseph, S., & Patil, K. P. (2024). Artificial intelligence technology readiness for social sustainability and business ethics: Evidence from MSMEs in developing nations. *International Journal of Information Management Data Insights*, *4*(2), 100250. https://doi.org/10.1016/j.jjimei.2024.100250

Lee Kah Yan, Abu Samah, I. H., A. Rahim, N. S., Yusof, J., & Ibrahim, A. (2024). The Influence of Job Stress Towards Turnover Intention among Generation Y Employees in Perak Information Technology. *International Journal of Business and Technopreneurship (IJBT)*, *13*(2), 175–188. https://doi.org/10.58915/ijbt.v13i2.960

Luthans, F., Avolio, B. J., Avey, J. B., & Norman, S. M. (2007). DigitalCommons @ University of Nebraska - Lincoln Positive Psychological Capital : Measurement and Relationship with Performance and Satisfaction Positive Psychological Capital : Measurement and Relationship with Performance and Satisfaction. *Personnel Psychology*, *60*, 541–572. https://digitalcommons.unl.edu/leadershipfacpub/11%0A

Monje-Amor, A., Abeal Vázquez, J. P., & Faíña, J. A. (2020). Transformational leadership and work engagement: Exploring the mediating role of structural empowerment. *European Management Journal*, *38*(1), 169–178. https://doi.org/10.1016/j.emj.2019.06.007

Nurprilinda, M., … F. G.-I. J. of, & 2021, undefined. (2021). Profile of gaster endoscopic biopsy results in patients at MRCCC siloam hospitals semanggi 2013–2017. *Repository.Uki.Ac.Id*. http://repository.uki.ac.id/5214/

O'Kane, C., Mangematin, V., Zhang, J. A., & Haar, J. (2024). How research agendas are framed: Insights for leadership, learning and spillover in science teams. *Research Policy*, *53*(7), 105029. https://doi.org/10.1016/j.respol.2024.105029

Ogbonnaya, C., Daniels, K., Messersmith, J., & Rofcanin, Y. (2023). A Theory-Based Analysis of Null Causality between HRM Practices and Outcomes: Evidence from Four-Wave Longitudinal Data. *Journal of Management Studies*, *60*(6), 1448–1484. https://doi.org/10.1111/joms.12881

Oni̧or, L.-F. (2015). Marketing Techniques Enhance Closed Innovation to form Open Innovation. *Procedia Economics and Finance*, *32*(15), 298–306. https://doi.org/10.1016/s2212-5671(15)01395-7

Pawerangi, M. H., Amang, B., & Nurpadila. (2023). Pengaruh Gaya Kepemimpinan Transformasional Dan Kepuasan Kerja Terhadap Kinerja Perawat Di Rumah Sakit Umum Lasinrang Kabupaten Pinrang. *SEIKO : Journal of Management & Business*, *6*(1), 468–476.

Prentice, C., Dominique-Ferreira, S., Wang, X., Tuominen, J., Duarte, M., & Rocha, H. (2024). Work-life imbalance, burning out, feeling down, I will quit, but quietly–the case of hospitality employees. *Journal of Hospitality Marketing and Management*, *34*(1), 24–45. https://doi.org/10.1080/19368623.2024.2389074

Rehman Khan, S. A., Ahmad, Z., Sheikh, A. A., & Yu, Z. (2022). Digital transformation, smart technologies, and eco-innovation are paving the way toward sustainable supply chain performance. *Science Progress*, *105*(4). https://doi.org/10.1177/00368504221145648

Riggio, R. E., & Mhatre, K. H. (2014). *Charismatic and Transformational Leadership: Past, Present, and Future Charismatic and Transformational Leadership: Past, Present, and Future Oxford Handbooks Online. February 2014.* https://doi.org/10.1093/oxfordhb/9780199755615.013.012

Saputro, R. (2021). Pengaruh Kepemimpinan Transformasional Dan OCB Terhadap Kinerja Karyawan Melalui Motivasi. *Jurnal EMBA*, *9*(2), 1103–1119.

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2020). Handbook of Market Research. In *Handbook of Market Research* (Issue July). https://doi.org/10.1007/978-3-319-05542-8

Schein, E. H. (1990). *Organizational culture* (Vol. 45, Issue 2). American Psychological Association.

Sexton, J. B., Adair, K. C., Profit, J., Milne, J., McCulloh, M., Scott, S., & Frankel, A. (2021). Perceptions of Institutional Support for "Second Victims" Are Associated with Safety Culture and Workforce Well-Being. *Joint Commission Journal on Quality and Patient Safety*, *47*(5), 306–312. https://doi.org/10.1016/j.jcjq.2020.12.001

Soyer Er, Ö., & Gül, İ. (2024). The Speaking Up Climate of Nurses for Patient Safety Concerns and Unprofessional Behaviors: The Effects of Teamwork and Safety Climate. *Journal of Perianesthesia Nursing*, *March*. https://doi.org/10.1016/j.jopan.2023.12.008

Suthatorn, P., & Charoensukmongkol, P. (2023). Asia Paci fi c Management Review How work passion and job tenure mitigate the effect of perceived organizational support on organizational identi fi cation of fl ight attendants during the COVID-19 pandemic. *Asia Pacific Management Review*, *28*(3), 347–357. https://doi.org/10.1016/j.apmrv.2022.12.003

Taloba, A. I., & Matoog, R. T. (2025). Detecting respiratory diseases using machine learning-based pattern recognition on spirometry data. *Alexandria Engineering Journal*, *113*(October 2024), 44–59. https://doi.org/10.1016/j.aej.2024.11.009

Tintami, L., Dr. Ari Pradhanawati, M. ., & Dr. Hari Susanto N., M. S. (2012). Pengaruh Budaya Organisasi Dan Gaya Kepemimpinan Transformasional Terhadap Kinerja Karyawan Melalui Disiplin Kerja Pada Karyawan Harian Skt Megawon Ii Pt. Djarum Kudus. *Diponegoro Journal of Social and Politic*, 1–8.

Wiljer, D., & Hakim, Z. (2019). Developing an Artificial Intelligence–Enabled Health Care Practice: Rewiring Health Care Professions for Better Care. *Journal of Medical Imaging and Radiation Sciences*, *50*(4), S8–S14. https://doi.org/10.1016/j.jmir.2019.09.010

Winarto, W., & Purba, J. H. (2018). Pengaruh Gaya Kepemimpinan Transformasional Terhadap Organizational Citizenship Behavior Dengan Kepuasan Kerja Sebagai …. *Jurnal Ilmiah METHONOMI*, *4*, 111–123. https://ejurnal.methodist.ac.id/index.php/methonomi/article/view/1029%0Ahttps://ejurnal.methodist.ac.id/index.php/methonomi/article/download/1029/838

Windlinger, R., Warwas, J., Hostettler, U., & Klumb, P. L. (2025). How vertical and shared constructive leadership impact teachers' daily work engagement and affective states: a micro-longitudinal study. *International Journal of Leadership in Education*, *00*(00), 1–22. https://doi.org/10.1080/13603124.2024.2442626

Yaqoob, E., Sahitia, N., Abbas Zaidi, D., Aftab, S., Sajid, F., Ali Khan, S., Chaurasia, B., & Javed, S. (2024). Intersection of Care: Navigating Patient-Hospital Relationships in Neurosurgery. *World Neurosurgery*, *193*, 842–850. https://doi.org/10.1016/j.wneu.2024.10.077

Younis, J. A., Al-Shammari, H., Hejase, H. J., Massoud, M., & Hejase, A. J. (2024). E-satisfaction as a mediator between consumer loyalty and E-CRM: The context of Lebanese e commerce. *International Journal of Innovative Research and Scientific Studies*, *7*(3), 978–996. https://doi.org/10.53894/ijirss.v7i3.2987