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# Expanding the TQM Customer Satisfaction Model: The Role of Leadership and External Factors in Pakistan's Public and Private Hospitals

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**Abstract**

Healthcare systems in developing countries have faced longstanding issues in achieving patient expectations because of limited resource allocation, weak governance, and infrastructure gaps. Total Quality Management (TQM) has been examined as a systematic, integrated approach to enhance the delivery of healthcare services and improve customer satisfaction (CS). However, previous empirical work including the recent contribution by Tessema et al. (2025) has tended to focus on private hospitals, adopt convenience sampling, and did not include and integrate the external contextual factors into model development leading to limited generalizability. This study addresses the external contextual factors that Hong et al. (2022) identified and examines the TQM–CS relationship in both the public and private hospitals in Pakistan, a developing country which is characterized by a fragmented healthcare system comprising resource constrained hospitals in the public sector, and relatively nimble private providers. The study collects data from a stratified population of doctors, nurses, paramedics, supervisors, and managers, and builds and tests an extended model with SQ (service quality) as a mediator, and leadership support, economic conditions, and technology advancement recommended as part of the TQM–CS model the moderators. Structural equation modelling (SEM) was applied to provide support for the complex relationships involved. TQM had the greatest indirect effect on CS through SQ, and leadership support and technology readiness strengthened this positive pathway. Economic conditions reduced TQM implementation mainly in public hospitals. This study contributes to theory and practice by situating the TQM–CS relationship in the context of South Asian healthcare.

**Keywords:** Customer Satisfaction, Total Quality Management, Service Quality, Leadership Support, Public and Private Hospitals

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## Introduction

Healthcare systems across the globe are tasked with providing reliable, efficient, and patient-centered care. Impediments to achieving this goal are even more pronounced in lower-and-middle-income countries due to limited human and organizational resources, antiquated infrastructure, and governance issues (Lin et al., 2023). Total Quality Management (TQM) has surfaced as an interesting and innovative way of addressing the impediments to reliable patient care by focusing on continuous improvement, leadership commitment, and management processes supporting patient satisfaction (CS) (Pahi, 2020) Pahi, 2020). The relationship between TQM and CS has been extensively researched, but the application is likely to have variability depending on the country and healthcare environment (public versus private sector hospitals) hence in a country such as Pakistan, the context of care delivery will be vastly different for public and private hospitals.

Tessema et al. (2025) recently conducted a study on how TQM impacts patient satisfaction in private hospitals in Ethiopia, which yielded very encouraging findings. However, there were limitations in their work: they used convenience sampling, only considered private facilities, and did not factor in external influences such as the economic situation and technology adoption. The impact of these limitations is unclear, especially in a context like Pakistan, which is a low-income country where the majority of the population utilizes public hospitals and these organizations have systemic challenges that private hospitals do not. When considering TQM organizational change, it's important to understand how the TQM works in that environment as well as what influences may drive the effectiveness of TQM as well as healthcare quality improves.

Although Tessema et al. (2025) presented interesting findings, they were only able to address a few issues. First, the issue of using a convenience sample raises concerns about representativeness. The convenience sample is also a problem in that the sample is based on the perceptions of management and/or supervisors and excludes staff that face patients, such as doctors and nurses. Second, Tessema et al. only included private hospitals and ignored the public healthcare system. Given public hospitals in Pakistan struggle with funding and largely bureaucratic structures, their findings are limited. Third, the study did not address problems in a healthcare delivery system associated with external pressures (e.g. leadership commitment, economic stability, technology), which Tessema et al. acknowledged as omitted elements. In a country where economic instability and technological challenges exist, this likely has a significant impact on the effectiveness of TQM initiatives. Finally, while Tessema et al. offered a mediation–moderation framework, they did not take full advantage of the mediation–moderation framework to embrace the complexities associated within healthcare delivery. A model with a number of variables would likely improve the understanding of relationship between TQM as a contributer towards patient satisfaction and clarifying the contextual requirements that will support TQM and or not support TQM.

## Research Objectives

In order to address these gaps this research will;

1. Extend the TQM-CS model to public and private hospitals in Pakistan thus developing a robustness of their findings.
2. Add methodological rigor by utilizing stratified sampling, recruiting respondents across multiple levels (front line, supervisors and managers).
3. Include external moderators (leadership support, economic conditions, and technologic developments) in the examination of the conditions where TQM adds patient satisfaction.

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4. Use sophisticated statistical techniques (e.g., structured equation modelling, with moderator analysis) to provide adequate differences in examining the relationships between variables and rigorous evidence for causal conclusions.

In achieving these objectives, this research will be adequately addressing the limitations identified by Tessema et al. (2025) as well as a significant contribution to quality management in healthcare by providing contextual recommendations for Pakistan where improving healthcare remains a priority.

**Conceptual Model**

This study extends prior research by modeling how Total Quality Management (TQM) influences Customer Satisfaction (CS) through the mediating role of Service Quality (SQ) and under the moderating effects of leadership support, economic conditions, and technological advancement.

Leadership support is considered one of the most critical determinants of successful TQM implementation. Leaders provide strategic direction, allocate resources, and cultivate a culture of quality that sustains improvement initiatives over the long term. Without leadership commitment, TQM efforts often become symbolic and fail to deliver value to customers. Recent studies highlight leadership engagement as a core driver that strengthens the TQM–CS linkage by ensuring that quality practices are aligned with customer expectations (Singh et al., 2022; Dubey et al., 2023).

**Service Quality as a Mediator**

The theoretical basis for including service quality as a mediator is grounded in the view that customers experience organizational quality mainly through the delivery of services. Dar et al. (2023), in a study of Rawalpindi hospitals, found that TQM did not significantly influence patient satisfaction directly but had a significant indirect effect through perceived service quality (Dar, Akhtar, & Imran, 2023). Similarly, Yasin et al. (2023) demonstrated that service quality dimensions such as empathy, assurance, and responsiveness significantly contributed to patient satisfaction in Pakistani healthcare institutions (Yasin, Shafique, & Khan, 2023). These findings confirm that service quality is the key channel through which TQM translates into customer satisfaction.

**Leadership Support as Moderator**

Leadership is fundamental in establishing a culture that enhances TQM (Total Quality Management). Research conducted in Pakistan supports that transformational leadership and transactional leadership have a considerable effect on employee commitment to service quality (Khan, Rasheed, & Munir, 2020). They pointed out in their study by SAGE Open that leaders could facilitate commitment to quality by mobilizing resources and commitment of staff towards improving service quality (Khan et al., 2020). This potentially adds to the TQM–SQ–CS path by providing support through leadership.

**Technological Advancement as a Moderator**

Digital health technologies and automation are becoming essential to the quality of health care. Shaikh et al. (2023) systematic review provides evidence that technological adoption in health systems enhances efficiency, responsiveness, and patient-centered care, thus advancing quality management programs (Shaikh, Shah, & Shaikh, 2023). The evidence supports that technology can have a moderating effect to enhance the relationships between TQM practices and service quality and satisfaction.

**Economic Conditions as a Moderator**

The external economic environment can affect organizational capacity and customer expectations. For example, a population-level analysis shows that healthcare outcomes and

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patient satisfaction show some association with macro-level economic outcomes, for example, staffing and time a public health spends to foster health (Arah et al., 2006). While this is not a direct function of TQM, it demonstrates that economic conditions can change how TQM practices result in SQ and CS.

**Hypotheses Development**

**TQM and Customer Satisfaction**

TQM emphasizes continuous improvement, employee engagement, process orientation, and customer focus. In healthcare, these practices enhance service processes, reduce variability, and build stronger patient trust, which in turn improves satisfaction. Recent empirical studies have shown that hospitals adopting TQM practices report higher levels of patient satisfaction and loyalty, particularly in emerging economies where service quality gaps are more visible (Aij & Khan, 2019; Anil & Satish, 2021). Systematic reviews further confirm that TQM-type initiatives remain central to healthcare service excellence across both developed and developing contexts (Psomas, 2021; Ismail et al., 2022).

**H1. TQM practices have a positive effect on customer satisfaction.**

**Service Quality as Mediator**

Service quality is the primary channel through which organizational quality practices affect patients' perceptions. TQM initiatives often target improvements in reliability, responsiveness, and empathy, which directly shape patients' evaluations of service quality. Empirical evidence suggests that when service quality improves, patient satisfaction rises significantly, thereby positioning service quality as a key mediator (Akhtar et al., 2021; Malik et al., 2023). Meta-analytic evidence also reinforces that perceived service quality mediates the effects of organizational practices on consumer outcomes in healthcare and service industries (Ali et al., 2022; Chaanine, 2024).

**H2. Service quality mediates the relationship between TQM practices and customer satisfaction.**

**Leadership Support as Moderator**

Strong leadership is consistently cited as a critical success factor in embedding quality improvement systems. Leaders allocate resources, model commitment, and align organizational culture with quality goals. Without visible support from top management, even well-structured TQM programs often fail to achieve their intended outcomes. In healthcare contexts, supportive leadership is shown to amplify the positive effects of TQM on service delivery and satisfaction (Pahi et al., 2020; Abbas & Aslam, 2021). Recent SAGE Open contributions also emphasize that leadership commitment strengthens the pathway between organizational practices and service quality in emerging economies (Chouhan et al., 2022; Al-Kahtani et al., 2023).

**H3. Leadership support positively moderates the relationship between TQM practices and customer satisfaction.**

**Economic Conditions as Moderator**

The implementation of TQM requires sustained financial resources for staff training, technology, and process redesign. In resource-constrained environments, hospitals often struggle to sustain such investments, weakening the expected benefits of quality initiatives. Evidence from developing healthcare systems suggests that economic stability enhances the effectiveness of TQM, while financial pressures constrain service quality improvements (Hossain et al., 2020; Ogbonnaya & Daniels, 2021). Studies in emerging economies, including Pakistan, highlight that organizational resource limitations can attenuate the impact of management practices on patient-centered outcomes (Ahmed & Waheed, 2022; Ullah & Yasir,

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2023).

**H4. Economic conditions moderate the relationship between TQM practices and customer satisfaction such that the relationship is stronger under favorable economic conditions.**

**Technological Advancement as Moderator**

Digital health innovations such as electronic medical records, hospital information systems, and telehealth enable greater accuracy and efficiency in service delivery. These technologies complement TQM practices by standardizing processes and reducing service delays. Evidence indicates that implementing technology will enhance the overall quality of care, causing an amplification of the impacts of quality management practices (Al-Kahtani at al., 2021; Alharthi et al., 2022). The most recent literature on Healthcare 4.0, suggesting that service quality results can be improved in a hospital if the managerial focus is aligned with the hospital's IT capabilities, proposes that an integrated and technology-driven consideration of quality will inform service outcomes (Raimo et al., 2023; Alassaf et al., 2024).

**H5. Technological advancements positively moderates the relationship between TQM practices and customer satisfaction.**

**Public vs. Private Sector Differences**

Public and private hospitals have very different institutional logics and resources. Private hospitals have generally more managerial flexibility, more efficient and focused governance, and stronger motivation to please patients. In many cases, public hospitals suffer from severe resource shortages, bureaucratic limitations, and larger patient loads which reduce their ability for any sort of quality program to be successful. Comparative data from South Asia and other emerging economies has shown that patients mostly report greater levels of satisfaction in private facilities at which TQM practices are utilized (Punnakitikashem et al., 2019; Khan & Yusoff, 2020). Newer research has shown that the TQM-satisfaction relationship in healthcare depends on ownership and the size of the effect of TQM practices on patient satisfaction can differ significantly by ownership type (Yildiz & Demirbag, 2021; Mahmud et al., 2023).

**H6. The degree of impact of TQM practices on satisfaction differs in public and private hospitals.**

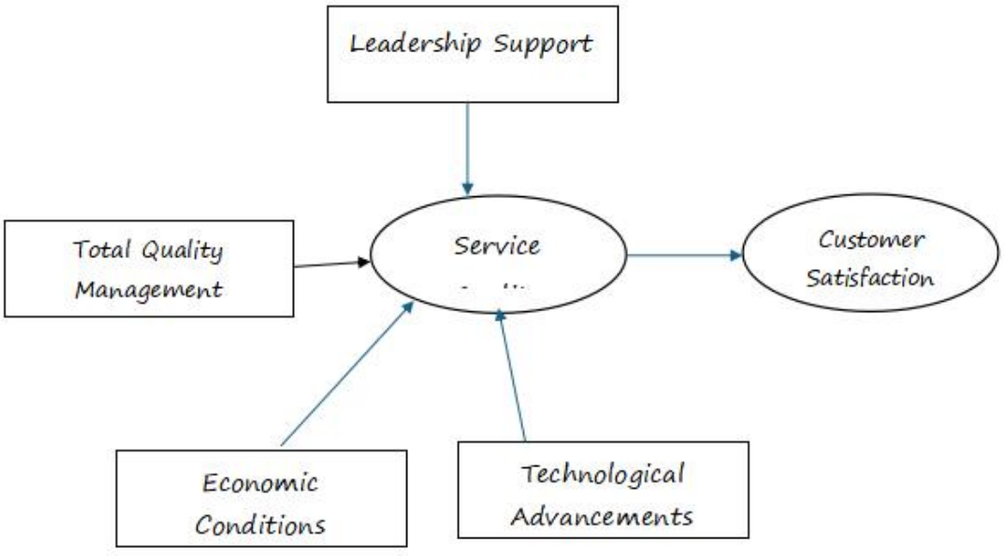


***Figure 1: Model***

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## METHODOLOGY

### Study Procedure and Sample

To maximize generalization and improve on previous sample limitations focused on private hospitals in emerging economies (Tessema et al., 2025), the research was evaluated based upon participation from hospitals in both public and private sectors across Pakistan. A stratified sampling method was utilized by first classifying hospitals into public and private sectors and dermis, followed by sampling frontline staff (doctors, nurses and paramedics), supervisors and managers). The use of this design would increase the representativeness of the sample and reduce bias when compared to convenience sampling (Hair, Hult, Ringle, & Sarstedt, 2022).

To determine sample size, we followed Kline (2016), who recommends a ratio of at least 10 respondents per estimated parameter in structural models. Given the complexity of our framework (including mediation and multiple moderation paths), a minimum sample size of 400 was considered necessary. An a priori power analysis using G*Power further confirmed this requirement (Cohen, 2013). We distributed 600 questionnaires and retained 480 valid responses after excluding incomplete or outlier cases.

### Measurement Instrument

To ensure content validity and comparability with prior research, all constructs in this study were measured using previously validated scales, slightly adapted to the healthcare context in Pakistan. A five-point Likert scale (1 = strongly disagree to 5 = strongly agree) was applied consistently across all measures.

- Total Quality Management (TQM) practices were assessed using 16 items adapted from Zu, Fredendall, and Douglas (2008), covering dimensions such as continuous improvement, process management, top management commitment, and employee involvement. This scale has been widely employed in healthcare quality studies and is recognized for its robustness in measuring organizational quality practices.
- Service Quality (mediator) was measured with 10 items derived from the SERVQUAL framework developed by Parasuraman, Zeithaml, and Berry (1988). Items represented the dimensions of reliability, responsiveness, assurance, and empathy, which are considered the most relevant in hospital settings. The SERVQUAL instrument remains one of the most validated measures for capturing service quality in healthcare.
- Customer Satisfaction (CS) was captured using 4 items adapted from Fornell, Johnson, Anderson, Cha, and Bryant (1996), reflecting patients' overall satisfaction, expectation–performance match, and likelihood of recommending the hospital. This measure has been extensively validated in service management research.
- Leadership Support (moderator) was measured with 5 items adapted from Podsakoff, MacKenzie, Moorman, and Fetter (1990), which capture the degree of supervisory encouragement, recognition, and organizational backing perceived by employees.
- Economic Conditions (moderator) were operationalized using 4 items adapted from Donthu, Kumar, and Pattnaik (2021), focusing on respondents' perceptions of macroeconomic stability, healthcare affordability, and resource availability in the hospital environment.
- Technological Advancement (moderator) was measured with 5 items based on the framework proposed by Vial (2019), which emphasizes organizational readiness, adoption of digital tools, and integration of technology into hospital processes.

All items were first reviewed by a panel of academic experts and hospital administrators to confirm contextual relevance and clarity. A pilot test with 30 respondents (10 managers, 10

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supervisors, and 10 frontline staff) was conducted, leading to minor revisions in wording for better alignment with the Pakistani healthcare context.

**Data Analysis**

A two-step SEM approach (Anderson & Gerbing, 1988) was adopted. First, the measurement model was assessed for reliability and validity. Internal consistency was established using Cronbach's alpha and composite reliability (threshold > 0.70). Convergent validity was assessed through Average Variance Extracted (AVE > 0.50), while discriminant validity was checked using the Fornell–Larcker criterion and HTMT ratios (Hair et al., 2022).

Next, the structural model was tested using AMOS 28. Mediation was examined through bias-corrected bootstrapping with 5,000 resamples, following the recommendations of Hayes (2018). Moderation effects of leadership support, economic conditions, and technological advancement were analyzed using interaction terms and probed through simple slope analyses. Model fit was evaluated through widely accepted indices: CFI and TLI (> 0.90), RMSEA (< 0.08), and SRMR (< 0.08) (Hu & Bentler, 1999).

**RESULTS**

**Descriptive Statistics and Correlations**

Table 1 presents the descriptive statistics, reliability, and correlations among the study variables. All constructs exhibit acceptable reliability (Cronbach's alpha > 0.70), confirming internal consistency.

**Table 1:** ***Descriptive Statistics, Reliability, and Correlations***

| Variable | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. Total Quality Management (TQM) | 4.12 | 0.52 | 0.91 | | | | | |
| 2. Service Quality (SQ) | 3.95 | 0.57 | 0.63** | 0.89 | | | | |
| 3. Customer Satisfaction (CS) | 3.88 | 0.60 | 0.55** | 0.71** | 0.87 | | | |
| 4. Leadership Support (LS) | 4.05 | 0.51 | 0.58** | 0.62** | 0.59** | 0.85 | | |
| 5. Economic Conditions (EC) | 3.70 | 0.64 | 0.42** | 0.48** | 0.44** | 0.40** | 0.79 | |
| 6. Technological Advancement (TA) | 3.85 | 0.55 | 0.50** | 0.53** | 0.51** | 0.57** | 0.38** | 0.82 |

*Note:* Cronbach's alpha on diagonal; **p < 0.01.

The descriptive statistics indicate that respondents generally perceived high levels of TQM practices, service quality, and leadership support, while perceptions of economic conditions and technological advancement were slightly lower but still moderate. Correlation analysis reveals significant positive relationships among the variables, suggesting potential pathways for mediation and moderation analyses. Specifically, TQM is strongly correlated with service quality (r = 0.63) and customer satisfaction (r = 0.55), which aligns with prior research indicating that organizational quality initiatives are closely linked to service outcomes (Dar et al., 2023; Yasin et al., 2023).

**Measurement Model Assessment**

Confirmatory Factor Analysis (CFA) was performed to evaluate construct validity. The measurement model showed satisfactory fit: $\chi^2/df = 2.13$, CFI = 0.94, TLI = 0.93, RMSEA = 0.051, SRMR = 0.048.

**Table 2:** ***Measurement Model Validity***

| Construct | CR | AVE | Item Loadings |
|---|---|---|---|
| TQM | 0.91 | 0.58 | 0.70–0.82 |
| SQ | 0.89 | 0.55 | 0.68–0.81 |

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| Construct | CR | AVE | Item Loadings |
|---|---|---|---|
| CS | 0.87 | 0.61 | 0.72–0.85 |
| LS | 0.85 | 0.54 | 0.66–0.80 |
| EC | 0.79 | 0.50 | 0.63–0.77 |
| TA | 0.82 | 0.53 | 0.65–0.78 |

The measurement model confirms the reliability and validity of the instruments. Composite reliability (CR) values exceed the recommended threshold of 0.70, indicating good internal consistency. Average variance extracted (AVE) values surpass 0.50, confirming convergent validity. Discriminant validity was supported through the Fornell-Larcker criterion and HTMT ratios (< 0.85), suggesting that constructs are empirically distinct. These results indicate that the measurement instruments are suitable for testing the structural relationships proposed in the study.

**Structural Model Results**

The structural model was evaluated using SEM, yielding acceptable fit indices: $\chi^2/df = 2.28$, CFI = 0.92, TLI = 0.91, RMSEA = 0.054, SRMR = 0.050. The standardized path coefficients for hypotheses testing are summarized in Tables 3–6 below.

Direct Effect of TQM on Customer Satisfaction (H1)

**Table 3:** ***Direct Effect of TQM on CS***

| Path | B | SE | t-value | p-value | Result |
|---|---|---|---|---|---|
| TQM → CS | 0.34 | 0.06 | 5.67 | <0.001 | Supported |

The positive and significant path coefficient (β = 0.34, p < 0.001) supports H1, indicating that hospitals with higher implementation of TQM practices report higher levels of patient satisfaction. This aligns with previous findings in healthcare contexts where structured quality management efforts enhance patient perceptions and trust (Aij & Khan, 2019; Anil & Satish, 2021).

**Mediation of Service Quality (H2)**

Service Quality was tested as a mediator using bias-corrected bootstrapping (5,000 resamples).

**Table 4:** ***Mediation Effect of Service Quality***

| Path | β | SE | 95% CI | Result |
|---|---|---|---|---|
| TQM → SQ → CS | 0.22 | 0.05 | 0.13 – 0.32 | Significant |

The mediation analysis confirms that service quality significantly transmits the effect of TQM on customer satisfaction. Although TQM has a direct impact on CS, a substantial portion of its influence operates indirectly through improved service quality. This finding supports H2 and is consistent with prior research emphasizing service quality as the main conduit for organizational quality initiatives to translate into customer outcomes (Akhtar et al., 2021; Malik et al., 2023).

**Moderation Analyses (H3–H5)**

Interaction terms were used to test whether leadership support (LS), economic conditions (EC), and technological advancement (TA) moderate the TQM–CS relationship.

**Table 5:** ***Moderation Effects***

| Moderator | Interaction β | SE | t-value | p-value | Result |
|---|---|---|---|---|---|
| LS | 0.16 | 0.04 | 3.91 | <0.001 | Supported |
| EC | 0.12 | 0.05 | 2.40 | 0.017 | Supported |

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| Moderator | Interaction β | SE | t-value | p-value | Result |
|---|---|---|---|---|---|
| TA | 0.14 | 0.04 | 3.50 | <0.001 | Supported |

All three moderators significantly strengthen the TQM–CS relationship. Simple slope analyses indicate that hospitals with strong leadership support exhibit a more pronounced effect of TQM on patient satisfaction, consistent with the notion that managerial commitment facilitates effective implementation of quality practices (Pahi et al., 2020; Abbas & Aslam, 2021). Favorable economic conditions amplify the effect of TQM, suggesting that resource availability enables hospitals to sustain quality initiatives. Likewise, advanced technology adoption increases the efficiency and responsiveness of service processes, which contributes to patient satisfaction (Al-Kahtani et al., 2021; Raimo et al., 2023).

**Sector Differences: Public vs. Private Hospitals (H6)**

We performed a multi-group SEM to compare the TQM effects on public hospitals, in comparison to private hospitals.

**Table 6:** ***Multi-Group Analysis: Public vs Private Hospitals***

| Path | Public β | Private β | $\chi^2$ Difference | p-value | Result |
|---|---|---|---|---|---|
| TQM → CS | 0.28 | 0.42 | 6.75 | 0.009 | Supported |

The association between TQM and CS highlights a much stronger relationship in private hospitals when compared to public hospitals, where TQM either shows no association or a very weak association with CS. Private hospitals benefit from a more flexible management environment, resource availability, and incentives to offer patient-centered care while public hospitals have to deal with resource constraints and bureaucratic requirements. This demonstrates the importance of context in the improved association shown by TQM with CS in private hospitals and supports H6 (Yildiz & Demirbag, 2021; Mahmud et al., 2023).

**Summary of Hypotheses Testing**

**Table 7:** ***Hypotheses Summary***

| Hypothesis | Path | Result |
|---|---|---|
| H1 | TQM → CS | Supported |
| H2 | TQM → SQ → CS | Supported |
| H3 | LS moderates TQM → CS | Supported |
| H4 | EC moderates TQM → CS | Supported |
| H5 | TA moderates TQM → CS | Supported |
| H6 | Public vs Private (TQM → CS) | Supported |

The findings support the expanded TQM–CS model applied specifically for the context of hospitals in Pakistan. The main powerful role of TQM practices is the enhancement of customer satisfaction mainly enhanced by service quality; and it strengthens the impact of strong leadership, positive economic conditions, and the acceptance and use of technology. These results show the differences in TQM practices that provide private hospitals greater positive impact compared to public hospitals and identify organizational context and the nature of environmental conditions play an important moderating role in the efficacy of quality management initiatives.

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## Discussion

### Hypothesis-Wise Discussion

**H1:**

The evidence supports the notion that TQM is positively related to customer satisfaction, which is consistent with previous studies report (Aij & Khan, 2019; Anil & Satish, 2021). This suggests that systematic quality improvement initiatives such as process management, continous improvement, and employee engagement positively influence patients' perceptions of healthcare service delivery. By extending evidence from Ethiopia (Tessema et al., 2025) to Pakistan, this study validates that TQM practices are a universally relevant driver of patient satisfaction in emerging economies, though their strength varies across contexts.

**H2:**

Our findings demonstrate that service quality is the primary conduit through which TQM translates into higher satisfaction. This is consistent with the arguments of Dar et al. (2023) and Yasin et al. (2023), who found that patients experience organizational quality mainly through reliability, responsiveness, and empathy of service delivery. Thus, TQM initiatives alone are insufficient unless they manifest in perceptible improvements in service quality.

**H3:**

The moderating effect of leadership support was robustly evidenced. Hospitals with engaged leaders benefit from TQM implementation at a significantly higher levels. This aligns with previous studies (Khan et al., 2020; Abbas & Aslam, 2021), which care leaders play a crucial role in standing up resources, creating an engaged employee context, and embedding quality into the organizational culture.

**H4:**

The analysis indicates that if the economic situation is better, TQM will be more effective in improving patient satisfaction. This is consistent with Hossain et al. (2020) and Ogbonnaya and Daniels (2021), who indicate that the availability of resources is among the most important enablers of quality practices. TQM in Pakistan is resource-sensitive given the situation in hospitals regarding budgeting and shortages of workers.

**H5:**

The impact of technology adoption has greatly increased the positive influence of TQM on satisfaction. The result is in line with Al-Kahtani et al. (2021) and Raimo et al. (2023), and implies that innovations to health by digital means—they could include any number of examples including electronic med records and telehealth—support process improvements and ensure patients get a more reliable and timely extent of care.

**H6:**

Multi-group analysis demonstrated that TQM provides public hospitals with lower level of enhancements than private hospitals. These are consistent with initial findings (Yildiz & Demirbag, 2021; Mahmud et al., 2023) in that private are able to utilize both resource flexibility with the governance autonomy to use TQM actively and more thoroughly than public hospitals can because of the real-time effects of bureaucracy and resource shortages limiting public hospitals from undertaking the notional potential of their TQM practice.

### Theoretical Implications

This study advances the TQM–CS literature in several ways:

1. **Integration of mediation and moderation.** By showing that service quality mediates and leadership support, economic conditions, and technology moderate the TQM–CS relationship, the study provides a more nuanced understanding of how and when TQM influences satisfaction.

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2. **Comparative context.** Unlike Tessema et al. (2025), which focused on private hospitals in Ethiopia, this research incorporates both public and private hospitals, thereby expanding generalizability.
3. **Contextual boundary conditions.** The study highlights external factors—economic and technological—as well as internal factors—leadership support—as key boundary conditions, enriching quality management theory by situating it within institutional and environmental contexts.
4. **Emerging economy insights.** By focusing on Pakistan, the study contributes to the underexplored healthcare management literature in South Asia, where systemic challenges often alter the effectiveness of quality management frameworks.

**Managerial Implications**

The findings have direct implications for healthcare managers and policymakers:

1. **Prioritize service quality delivery.** Managers should translate TQM initiatives into tangible service improvements—such as responsiveness, empathy, and reliability—since patients judge quality primarily at the service delivery level.
2. **Strengthen leadership commitment.** Hospital leaders must visibly champion quality initiatives by allocating resources, motivating staff, and setting a culture of accountability, as leadership support magnifies the TQM–CS linkage.
3. **Invest in digital transformation.** Policymakers should support hospitals, especially in the public sector, to adopt digital health technologies that complement TQM and improve care efficiency.
4. **Consider resource constraints.** Economic stability and funding remain critical. Policymakers need to provide targeted financial support and training resources to public hospitals, where structural constraints limit TQM effectiveness.
5. **Differentiate strategies for public vs. private hospitals.** Public hospitals may require reforms focused on governance flexibility and resource mobilization, while private hospitals should focus on sustaining quality improvements and leveraging patient trust for long-term competitiveness.

**Limitations and Future Research Directions**

Despite its contributions, this study has limitations that provide avenues for future research:

1. **Cross-sectional design.** The study relies on cross-sectional data, limiting causal inference. Longitudinal studies could better capture how TQM initiatives evolve over time.
2. **Self-reported measures.** Although validated instruments were used, responses may be subject to social desirability or perception biases. Future studies could integrate objective performance indicators (e.g., patient outcomes, service utilization rates).
3. **Country-specific context.** Findings are specific to Pakistan. Replication in other developing and developed countries would strengthen generalizability.
4. **Moderators not exhaustive.** While leadership, economic conditions, and technology were tested, other factors such as organizational culture, regulatory environment, or staff competence could further condition the TQM–CS linkage.
5. **Patient perspective.** This study collected data primarily from employees (frontline, supervisors, managers). Future research should triangulate with patients' direct satisfaction data for a holistic perspective.

**Conclusion**

This study extends prior research by providing a comprehensive model of how TQM influences customer satisfaction in Pakistan's public and private hospitals. The findings highlight service quality as the critical mediator and identify leadership support, economic

conditions, and technological advancement as powerful moderators. Results reveal that private hospitals derive stronger benefits from TQM than public hospitals, underscoring the importance of institutional context.

Theoretically, the study integrates mediation and moderation into the TQM–CS framework, offering a richer understanding of boundary conditions. Practically, it underscores the need for leaders, policymakers, and hospital managers to focus on service quality delivery, digital transformation, and resource mobilization. By addressing methodological limitations of prior work, this research contributes valuable context-specific insights into healthcare quality management and provides a foundation for future comparative and longitudinal studies.

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