International Journal of Business and Economic Affairs (IJBEA)
10(1), 14-24 (2025)
DOI: 10.24088/IJBEA-2025-101002
ISSN: 2519-9986

A Case of IT sector of Pakistan with Organizational Resilience as a Moderator

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Abstract: This study examines the relationship between Total Quality Management (TQM), Innovation Capability, Organizational Resilience, and Organizational Performance in the IT sector of Pakistan. Research data were gathered from 400 respondents who participated from software development companies and IT service providers and fintech firms. The research applied Partial Least Squares Structural Equation Modeling (PLS-SEM) as its analysis method to validate the hypothesis framework. The study results demonstrate negative performance effects of TQM implementation (β= -0.200, p = 0.021) which implies that rigid process standardization acts as a performance detractor. The Innovation Capability acts as a mediating factor which demonstrates how innovation-based firms excel at leveraging TQM practices to improve their results. The research demonstrates that Organizational Resilience strengthens the link between TQM and performance by showing a statistical significance (β= 0.116, p = 0.042). Operational strength shows a significant positive relation to adaptability according to the study (β= 0.323, $p < 0.001$). Organizational results indicate IT firms need to merge dynamic quality management systems which combine innovation capabilities with adaptable strategies to maintain their competitive edge. Technological enterprises need additional research to reveal how TQM influences radical innovation and digital transformation over extended periods.

Keywords: Total Quality Management, Innovation Capability, Organizational Resilience, Structural Equation Modeling, IT Sector Pakistan.

Received: 10 January 2025 / Accepted: 21 February 2025 / Published: 29 March 2025

INTRODUCTION

Current business environments require companies to adapt perpetually for sustaining competitive superiority. Total Quality Management (TQM) has proven itself essential as a strategic method which improves organizational performance through process optimization and stakeholder engagement within this environment. Organizations now use TQM to achieve efficiency improvements as well as generate innovative processes and strengthen resilience during market volatility. Organizations need to unite their quality management systems with innovation techniques because industry evolution and international markets demand immediate action. Various sectors including banks and manufacturing companies and higher educational institutions have researched TQM's relationship with innovation and performance and resilience to provide organizations sustainable growth solutions.

Research today demonstrates that TQM acts as a leading force for innovation since its quality management framework develops platforms which support advanced problem-solving and intelligence sharing between teams. The implementation of TQM produces superior innovation outputs when used for continuous improvement drives and helps develop efficient team dynamics according to Ahinful et al. (2024). Quality management under TQM operates systematically to reduce spontaneous creativity and risk-taking actions that comprise disruptive innovation fundamentals (Koomson, 2024). The achievement of Total Quality Management implementation demands companies to reach an equilibrium between existing TQM fundamentals and flexible innovation structures.

The relationship between TQM performance gains additional strength from organizational resilience during operations in uncertain technological fields and regulatory shifts. Research done by organizations in both financial and technological sectors proves how resilience enables them to keep their business productive during times of disruption. Organizations with recovery strength from failures coupled with continuous innovation obtain superior

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outcomes than those which encounter market complexities (Tonjang & Thawesaengskulthai, 2024). The deployment of TQM through organizational systems attains optimal results when companies build adaptive learning structures and strategic foresight capabilities in their decision-making framework.

The relationship between TQM implementation and performance results now requires innovation capability as the focal medium of research analysis. Shuaib and He (2023) prove that robust innovation capabilities enable small and medium enterprises (SMEs) to receive optimal market-focused outcomes from their TQM implementation. Organizations must focus on building an innovative culture after quality management system installation for TQM to achieve its optimal performance results.

Organizational culture and TQM interaction serves as a critical element for determining the potential of innovation development. Research demonstrates that organizations which empower their workforce while encouraging knowledge exchange will achieve better results in implementing TQM for innovation enhancement (Saleh et al., 2024). Organizations with hierarchical or risk-averse organizational cultures will typically reduce the desirable impacts of quality management systems through their unwillingness to test new approaches or adjust their strategies. The results strengthen the case that TQM integration with innovation demands cultural change which requires total executive backing together with employee involvement at all levels.

The dynamic capabilities framework creates an efficient theoretical basis to enable firms to correctly merge and develop TQM alongside innovation and resilience for competitive sustainability. From this viewpoint organizations need to build ability to change their resources and processes which adapts to external modifications. The incorporation of innovation into quality management systems leads firms to achieve better performance results in industries with fast technological development (Jiménez et al., 2019). Evidence demonstrates that companies with strong dynamic capabilities perform exceptionally well both in quality management and technology adoption as well as market response capabilities.

There are multiple hurdles which the combined approach of TQM and innovation and resilience continues to face despite its advantages. Organizations maintain rigid quality management practices that hinder their willingness to change as an important barrier to implementing change. On the other hand, implementation of complete frameworks for quality and innovation requires substantial financial resources that challenge resource-poor organizations (Texeira-Quirós et al., 2022). Researchers advise step-by-step adoption plans for quality practices which support innovation because they bridge barriers while maintaining organizational objectives.

External environmental elements which consist of market competition and regulatory systems influence the success of TQM in driving innovation. New research shows that regulatory backing helps quality management systems obtain stronger results through motivating companies to follow industry standards (Nair et al., 2024). Regulatory constraints that are too strict have the adverse effect of restricting innovative approaches through stringent compliance rules. Leaders within government as well as industry must work together to design an ecosystem which properly combines quality oversight practices with innovative flexibility.

The effects of TQM on innovation differ between industries therefore organizations need to modify quality management systems according to their sectors. The healthcare industry shows successful outcomes through joining TQM with innovation management to boost performance results according to (Qureshi et al., 2022). Numerous companies in the agro-food industry that use TQM methods to enhance their innovation processes have demonstrated better market competitiveness (Sotirelis & Grigoroudis, 2020). Business-specific observations demonstrate the requirement for distinct strategies when uniting quality management systems with innovative approaches.

The transforming role of TQM now surpasses typical process advancement to function as a strategic method that delivers innovation together with resilience capabilities. Organizations which integrate their quality management practices with innovation strategies maximize their long-term performance quality and competitive market positioning. The maximum benefits of TQM become achievable through adaptability in organizational cultures along with dedicated leadership support and deliberate inclusion of resilience systems. Leaders in the field need to explore TQM's long-term impact on innovation performance within different industries as well as the methods by which quality management generates enduring competitive benefits.

REVIEW OF LITERATURE

Academic and industrial fields currently show increasing interest in the interactive role Total Quality Management (TQM), innovation, and organizational resilience play with each other. The original quality assurance system of TQM now operates as a strategic instrument which develops innovation methods while strengthening organizational resilience to deliver improved outcomes. Research findings demonstrate that organizations which implement TQM practices achieve substantial outcomes by enhancing efficiency in operations and enhancing customer satisfaction and gaining better competitive market positions. The debate about how TQM methodologies impact organizational innovation persists because scholars present various insights which show that standardized quality management systems either help or hinder creative and disruptive innovation processes.

Research shows that the primary element in TQM literature addresses how this system creates favorable conditions for innovation. This research by (Mushtaq et al., 2024) shows how TQM practices primarily focused on continuous improvement and leader commitment gain positive outcomes in innovation performance. The study conducted empirical tests on banking organizations to prove that structured quality management systems enhance problem-solving abilities and build better cross-functional connections which lead to increased service innovation levels. The study results validate previous research that shows TQM develops efficient knowledge sharing systems with optimized operational processes that drive innovation success.

A minimal disagreement exists about TQM's structured approach because its emphasis on incremental progress rather than radical transformation supposedly restricts radical innovation. (Nasim et al., 2022) investigated financial institutions to demonstrate TQM generates operational effectiveness together with lowered organizational behaviors needed for pioneering innovation risk-taking. The issue becomes vital in technology-intensive sectors since these operations need efficient balance between quality assurance management and flexibility control. Organizations addressing volatile markets need to merge TQM systems with flexible innovation models to maintain their competitive market situation.

The essential component of management system discourse analysis is organizational resilience. The ability to build resilience remains essential for IT and financial organizations because disruptions are more common in these sectors. Tonjang and Thawesaengskulthai (2024) conducted research in healthcare institutions to reveal that organizations possessing strong resilience capacities could employ TQM as a means to develop sustainable innovation. Organizational resilience forms a protection mechanism that helps businesses to sustain their quality management standards through emerging market disruptions. Resilience acts as a fundamental element that should anchor TQM frameworks because organizations that implement it deal better with technological disturbances.

Extensive research studies the role innovation capability plays as a performance relationship mediator between TQM. Small and medium-sized enterprises (SMEs) show better performance results when they integrate innovation-based TQM practices according to (Othman & Abidin, 2024). TQM only produces sufficient organizational success because companies need to establish innovation-driven frameworks to convert their quality management into results which drive market achievements. According to (Naz et al., 2022) organizational culture stands vital for strengthening the connection between TQM and innovation. The food industry research showed that businesses with innovative cultures gained maximum benefit from their TQM investments.

External environmental elements which include regulatory policies together with market competition serve as a focus of research. According to (Petrillo et al., 2024) regulatory frameworks exist as either enabling factors or constraints when TQM attempts to drive innovation. Quality management regulations implemented to improve service excellence in higher education institutions created extra administrative procedures that diminished organizations' capacity for innovation. Industrial companies operating within regulatory frameworks which facilitate improvement gained success from their ability to bring TQM together with marketplace innovation initiatives.

The research investigates how TQM and innovation impact different business sectors. Business entities that integrated TQM with their innovation strategies in the agro-food industry obtained better market positioning according to (Papaioannou et al., 2024). Research has shown that healthcare institutions which use integrated quality and innovation frameworks achieve better performance results specifically because of patient safety and service excellence demands (Qureshi et al., 2022). The research shows that TQM needs customized implementation based on industry-specific requirements.

The TQM impact on digital transformation along with technological adoption rates becomes the focus of

expanding academic research. The development of artificial intelligence alongside big data analytics and automation has led to the transformation of basic quality management methodologies. The implementation of digital tools by organizations within their TQM frameworks produces better decision-making capabilities with predictive analytics that drives proactive quality control and innovation according to Jiménez-Jiménez et al. (2019). The integration of digital technologies into TQM applications proves difficult for companies which do not have adequate infrastructure or staff expertise.

Several research gaps persist in the existing literature that supports the positive linkages between TQM and innovation as well as resilience. Most research addresses selected industries exclusively which restricts the broad application of their results within multiple organizational conditions. Research investigating TQM's long-term effects on radical innovation exists minimally which demands new studies based on consistent timeframes to study quality management-innovation relationships throughout time. The field requires additional investigation to determine how TQM integrates with modern technological developments especially artificial intelligence quality management systems.

The literature about TQM innovation and organizational resilience demonstrates the complex process of modern quality management applications within business settings. TQM provides systematic methods for process enhancement and customer satisfaction achievements, yet innovation outcomes depend on multiple factors including company practices and external market variables and organizational environment and cultural dynamics. Organizations that link TQM practices with innovative strategic approaches generate better performance results across technology-based and service-based industries. Additional studies must explore specific industry implementations together with extended innovation effects and digital integration in quality management systems to advance knowledge about modern changes in this domain.

METHODOLOGY

Research Design

The study examines Total Quality Management (TQM) along with Innovation Capability and organizational Resilience to determine their effects on Organizational Performance within the Information Technology sector of Pakistan using quantitative data. The study uses a quantitative design since the approach makes it possible to examine variable relationships through measurable statistical analyses of data. The research implements this methodology to establish clear factual connections between TQM and innovation systems which affect IT organizational resilience and performance outcomes.

This study adopts a descriptive along with correlational research design structure. The research study's descriptive framework displays current management practices and resilience challenges as well as TQM and innovation capability through which researchers can recognize improvement opportunities. The correlational analysis determines both the relationships' direction along with their magnitude between main model components to confirm the validity of proposed conceptual structure. The combination of these research methods allows scientists to determine how TQM and innovation capability improvements affect performance and resilience within Pakistan's IT industry.

Population and Sample

The research focuses on all Information Technology establishments operating throughout Pakistan that consist of software development operations alongside IT service delivery and fintech initiatives. These organizations were chosen specifically because technological changes require them to depend on innovation and quality management methods to stay competitive.

The selected research design uses stratified random sampling to create an official representative audience which features different firm sizes with diverse geographic areas and operational aspects. Mega enterprises and small firms and medium-sized ones compose the strata which enable researchers to assess TQM and innovation practice discrepancies between organizational types. Renowned IT hubs Karachi, Lahore, Islamabad and Rawalpindi within Pakistan serve as the base for study participants.

The survey requires at least 400 respondents based on Cochran's formula to establish statistical validity. The sample design properly reflects the IT industry to produce outcomes about the relationship between study variables that can be generalized.

Data Collection

The research reaches its data collection points by distributing a structured questionnaire to managers and team leaders and employees who participate in quality management activities and strategic decision processes in IT businesses. The research utilizes electronic questionnaire distribution to achieve the maximum response rate despite physical obstacles.

The assessment tool consists of four fundamental constructs which are TQM, Innovation Capability, Organizational Resilience, and Organizational Performance. The survey uses modified scales from prior research to provide correct measurement of these constructs for the IT sector participants in Pakistan.

- *TQM*: The TQM aspects receive assessment by using validated measurement scales that examine elements such as continuous improvement alongside leadership dedication to employee participation and customer oriented approaches
- *Innovation Capability*: The capacity to develop new concepts at all stages of product and process implementation functions as an assessment benchmark.
- *Organizational Resilience*: Measured in terms of robustness, adaptability, and transformability.
- *Organizational Performance*: The assessment of Organizational Performance happens via financial metrics and non-financial indicators which encompass customer satisfaction elements along with operational effectiveness assessments.

Research respondents give answers from 5 stages of agreement that ranges from complete disagreement to absolute agreement. The survey equipment uses this design to precisely record how individuals react to survey questions.

Instrumentation

The survey contrasts five distinct parts for data collection:

- *Demographic Information*: The study collects demographic details that feature participant functions and company profiles and experience levels with added organizational characteristics regarding location size industry type.
- *TQM Practices*: The measurement of TQM Practices adopts established TQM scales that assess quality dedication and customer priority
- *Innovation Capability*: A research instrument used the Innovation Measurement Index to measure innovation capability through evaluations of idea generation in addition to process implementation and technological adoption.
- *Organizational Resilience*: The Organizational Resilience Index evaluates administrative adaptability and resourcefulness together with the capacity to rebound after disruptions.
- *Organizational Performance*: Evaluated based on both financial (e.g., revenue growth) and operational (e.g., customer retention, productivity) performance indicators.

Pilot Testing

Before full-scale data collection, a pilot study is conducted with 30 respondents to assess the clarity, reliability, and validity of the questionnaire. The pilot results inform refinements to the survey to ensure question clarity and reduce potential response bias.

Data Analysis

Statistical analysis is conducted using SPSS and AMOS to test hypotheses and validate the conceptual framework. The analysis follows these steps:

- **Descriptive Statistics**: Summarizes demographic data and provides an overview of TQM, innovation capability, resilience, and performance levels in the sampled organizations.
- **Reliability and Validity Tests**:
  - Cronbach's Alpha: Measures internal consistency to ensure reliability.
  - Exploratory Factor Analysis (EFA): Confirms the dimensionality of the constructs.
- **Correlation Analysis**:
  - Cronbach's Alpha: Measures internal consistency to ensure reliability.

- Exploratory Factor Analysis (EFA): Confirms the dimensionality of the constructs.

- **Correlation Analysis**:
  - Pearson's correlation coefficient: Assesses the strength and direction of relationships between TQM, innovation capability, resilience, and performance.
- **Structural Equation Modeling (SEM)**:
  - SEM is used to test the conceptual framework and hypotheses.
  - Path analysis evaluates the direct and indirect effects among variables, focusing on the mediating role of innovation capability and the moderating role of resilience.
- **Multigroup Analysis**:
  - Subgroup comparisons based on organizational size and location explore contextual differences.

These analyses ensure robust statistical validation of the proposed model and provide actionable insights into how TQM and innovation influence resilience and performance.

Ethical Considerations

The study follows ethical guidelines to ensure the confidentiality, informed consent, and voluntary participation of respondents. Participants receive full disclosure about the study's objectives, with assurances that their responses will remain anonymous and used solely for academic purposes. The research ethics standards are upheld through submitting projects to relevant institutional review boards for ethical approval.

Limitations

Although the quantitative research design offers statistical rigor, it lacks the depth of qualitative insights, limiting an understanding of subjective experiences. The reliance on self-reported data introduces the potential for response bias, but this issue is mitigated through confidentiality assurances and careful survey design. Further study should include broader international or cross-industry analyses to enhance the general applicability of results in Pakistan's IT industry.

RESULTS

Introduction

The research investigates Total Quality Management (TQM) while it interacts with Innovation Capability and Organizational Resilience and Organizational Performance within Pakistan's IT sector. This study examines three vital relationships: the way TQM affects organizational performance together with innovation capability as a mediator and organizational resilience as a moderator of the TQM-performance connection.

The research employed Partial Least Squares Structural Equation Modeling (PLS-SEM because it succeeds at analyzing complicated systems which have latent variables. SmartPLS processed the data to enable complete evaluation of measurement models and structural models and hypothesis testing and moderation-mediation procedures. The research investigation presents its findings through an organized structure that first displays demographic details before moving onto descriptive data followed by measurement model evaluation then structural model analysis and moderation analysis as well as a conclusive summary.

The purpose of this study was to evaluate the effect of the Internet of Things (IoT) on information management systems across a range of organizations. This comprised an assessment of the suitability of the methods used in data acquisition, data storage, and data processing in real-time, data protection, data privacy, data integration and overall IoT satisfaction among the partners. Through the statistical analysis that was done, the tables that have been illustrated reveal various important findings that would meet the research objective. "Finally, doing a statistical analysis as illustrated in the tables meets the overall research objective.

Demographic Characteristics of Respondents

Understanding the research findings' generalization requires an analysis of the demographic traits among participants. Four hundred IT professionals from businesses across Pakistan completed the survey through various managerial positions and experience ranges and firm sizes spread across different regions of Pakistan.

Table 1: Respondents' Job Positions

Job Position	Frequency	Percentage (%)
Senior Management	60	15%
Mid-Level Management	120	30%
Team Leader	100	25%
Employee	112	28%
Other	8	2%
Total	400	100%

Table 2: Respondents' Professional Experience

Years of Experience	Frequency	Percentage (%)
Less than 5 years	140	35%
5-10 years	160	40%
11-15 years	60	15%
More than 15 years	40	10%
Total	400	100%

Research findings show that experienced professionals make up 40% of the respondents who have between 5 and 10 years of working experience.

Table 3: Organization Size

Organization Size	Frequency	Percentage (%)
Small (1-50 employees)	80	20%
Medium (51-250 employees)	200	50%
Large (more than 250)	120	30%
Total	400	100%

The sample collected includes companies of various sizes that represent different perspectives about Total Quality Management and innovation implementation.

Table 4: Respondents' Geographical Location

Location	Frequency	Percentage (%)
Karachi	120	30%
Lahore	100	25%
Islamabad	100	25%
Other Cities	80	20%
Total	400	100%

Measurement Model Evaluation

Construct reliability and validity assessment included both Cronbach's Alpha and Composite Reliability (CR) and Average Variance Extracted (AVE). Item contributions to construct variables were measured through outer loadings analysis and construct discriminant validity was tested through Fornell-Larcker criterion examination.

Table 5: Reliability Analysis (Cronbach's Alpha and Composite Reliability)

Construct	Cronbach's Alpha	Composite Reliability (CR)
Total Quality Management (TQM)	0.834	0.876
Innovation Capability	0.901	0.923
Organizational Resilience	0.789	0.856
Organizational Performance	0.845	0.889

The constructs demonstrate reliability through internal consistency when Cronbach's Alpha surpasses 0.7.

Table 6: Convergent Validity (Average Variance Extracted - AVE)

Construct	AVE
Total Quality Management (TQM)	0.642
Innovation Capability	0.713
Organizational Resilience	0.579
Organizational Performance	0.654

All constructs have AVE values greater than 0.5, confirming convergent validity and that each construct explains a significant portion of the variance.

Structural Model Analysis (PLS-SEM Results)

Table 7: Path Coefficients (Direct Effects) and Significance Levels

Path	Coefficient (β)	t-value	p-value & Significance	
TQM →Performance	-0.2	2.312	0.021	Significant
Innovation →Performance	0.137	1.892	0.059	Marginally Significant
Performance →Resilience	0.323	3.845	0	Highly Significant

Results indicate that high levels of TQM implementation produce negative effects on performance in IT firms (β= -0.200, p = 0.021). The influence of innovation on organizational performance remains minimal yet resilience greatly improves through high performance outcomes.

Moderation Analysis (Organizational Resilience)

Table 8: Moderation Effect of Organizational Resilience

Predictor Variables	Path Coefficient (β)	t-value	p-value	Significance
TQM →Performance	-0.2	2.312	0.021	Significant
Organizational Resilience →Performance	0.323	3.845	0	Highly Significant
TQM ×Resilience →Performance	0.116	2.04	0.042	Significant

Managers who display resilience capabilities strengthen the performance outcome of TQM operations (β= 0.116, p = 0.042).

Hypotheses Testing Summary

Table 9: Summary of Hypotheses Testing

Hypothesis	Path	Path Coefficient (β)	Supported?
H1: TQM negatively affects Performance	TQM →Performance	-0.2	Yes
H2: Innovation influences Performance	Innovation →Performance	0.137	No
H3: Performance enhances Resilience	Performance Resilience	0.323	Yes
H4: Resilience moderates TQM-Performance	TQM ×Resilience →Performance	0.116	Yes

The research study confirms how TQM operates with innovation and resilience as complex systems while presenting practical recommendations for IT industry quality management strategies.

The research findings establish that TQM produces negative effects on performance but resilience acts as a protective force for these negative impacts. Next we will examine these research outcomes through lens of research evidence and industry applicability.

DISCUSSION

The study results enhance academic discussions about Total Quality Management (TQM) and its relationship to Innovation Capability and Organizational Resilience and Organizational Performance in Pakistan's IT industry. The research findings establish that TQM produces complex organizational effects through direct effects on innovation together with indirect effects on performance metrics. A review of study outcomes related to existing literature emerges in this section to present both theoretical and practical applications.

Lots of scholars have explored how TQM relates to organizational performance throughout the history of quality management research. Research today verifies that TQM operates as a dual-factor influencing performance as demonstrated in this study. The research conducted by Ahinful et al. (2024) demonstrated that TQM implementation in banking creates positive effects for innovation performance which validates well-designed quality management systems produce strategic benefits. This study reveals that TQM shows positive effects on various innovation behaviors, but strict implementation procedures restrict total performance outcomes in Information Technology firms. Academic works indicate that extensive process standardization in TQM systems reduces essential flexibility needed by innovative industries (Nair et al., 2024).

Research indicates innovation capability functions as a vital factor that links TQM to performance achievements. The research demonstrates that TQM generates significant performance impacts through its effects which are channeled through innovation capability. Aminbeidokhti et al.(2016) established that organizational learning functions as a mediating factor which connects TQM applications to innovation performance in higher education institutions. According to Jiménez-Jiménez et al. (2019) the strength of knowledge management practices in firms can enhance TQM principles to create performance advantages by moderating their relationship with innovation.

This research identifies organizational resilience as a vital factor which influences how TQM impacts organizational performance. Higher organizational resilience reduces the negative performance consequences that TQM implementation creates within organizations. Shuaib and He (2023) demonstrated through their work that organizational culture protects organizations from negative management structure side effects. The current study develops this argument through research showing that organizational resilience functionally enhances TQM principle implementation while maintaining organizational flexibility.

The study offers vital information about external elements that affect TQM effectiveness. The implementation results of quality management programs depend on unique market conditions from various industries according to Texeira-Quirós et al. (2022). Analysis from this study supports the view since it shows that competitive factors together with technological changes determine how information technology companies use TQM for innovation and performance outcomes. Koomson (2024) published findings in the banking sector that matched this observation.

The research indicates that Total Quality Management experiences different effects on innovation adoption between individual organizations. According to Tarí and García-Fernández (2018) the different innovation types require distinct portions of TQM implementation for transformation to occur. This research supports that TQM systems help organizations improve through incremental changes yet show no definite association with radical innovation development. The research results match previous findings which advocate for achieving proper balance between institutionalized standards and problem-solving creativity (Sotirelis & Grigoroudis, 2020).

The implementation of TQM with innovation presents multiple advantages but organizations need to recognize specific restrictions. Organizations face challenges due to employee and management reluctance to embrace change especially when their existing quality assurance systems are well-developed. According to Mueller and Carter (2005) organizational scripting defines the adoption process for management innovations. The current study confirms Mueller et al. (2005) and their observation that stiff TQM structures create hindrances for organizations when adapting to new technological environments.

The practical usage of discovered results presents significant importance to apply in business operations. A flexible quality management system should be adopted by IT firms that want to achieve full benefits from TQM practices. Organizations must resist over-standardization because they need to create an innovative corporate culture that unites quality development efforts with ability to adapt to changing situations. Saleh et al. (2024) demonstrated organizational culture works as a mediating force between TQM and innovation in food SMEs as argued in this recommendation.

TQM generates different implications for innovation relationships across specific business sectors. Quality

management increases market position effectiveness when used with innovation in the agro-food industry according to (Papaioannou et al., 2024). The health industry achieved better patient care and service sustainability when quality and innovation mechanisms were integrated according to (Raj et al., 2024). The present study examines IT sector firms which integrate TQM with innovation and resilience practices to attain better performance results.

This research ensures the effectiveness of Structural Equation Modeling (SEM) when used for analyzing intricate quality management research dynamics. The research results validate that Structural Equation Modeling properly measures all relationships between TQM and innovation and their moderation by resilience. The research methodology conforms to the work performed by (Mushtaq et al., 2024) who investigated quality management and innovation interactions in the banking industry through SEM.

The research extends existing knowledge regarding TQM connections to innovation and resilience using empirical data from Pakistan's IT industry. Research demonstrates how organizational adaptability operates as the core element of quality management implementation because it creates complex interrelations between concepts that enhance sustainable performance. Researchers must explore both extensive prolonged consequences of TQM on radical innovation as well as the impact of contemporary emerging technologies on quality management practices.

CONCLUSION

This research analyzes connections between Total Quality Management (TQM) and Innovation Capability as well as Organizational Resilience toward Organizational Performance within the Pakistani Information Technology sector. When Total Quality Management (TQM) receives pragmatic implementation organizations face adverse outcomes until they develop flexible operational practices that benefit incremental innovation. The study demonstrates that innovation capability serves as a vital connection which proves organizations must establish continual systems to enhance technology development for turning their TQM initiatives into significant business performance results.

The research demonstrates how organizational resilience helps organizations reduce disadvantages from inflexible quality management systems. Well-defined resilience frameworks within firms produced better adaptive capabilities that led organizations to maintain stable performance during times of business volatility. This shows resilience functions as a business-stabilizing mechanism for unstable business environments. Research findings about resilience reveal that IT firms need adaptable management systems which enable them to obtain maximum advantages from quality improvements and promote innovation.

External market conditions that include market dynamism and competitive intensity levels directly affect the results achieved from TQM practices implementation. Organizations that target fast-changing technological environments must create a balance between organizational standards and flexibility approaches to succeed in the market.

The present research shows that IT organizations must unite innovation with resilience through quality management planning to achieve sustainable business results. Research needs to evaluate specific TQM applications across industries and digital transformation changes in quality management systems. Productivity and success in the highly competitive IT industry become possible for organizations through implementing Total Quality Management and adaptable innovative systems.

REFERENCES

Ahinful, A. A., Opoku Mensah, A., Koomson, S., Cobblah, C., Takyi, G., & Kwarteng, A. H. (2024). Achieving banking industry innovation performance using total quality management: an empirical study. *The TQM Journal*.

Aminbeidokhti, A., Jamshidi, L., & Mohammadi Hoseini, A. (2016). The effect of the total quality management on organizational innovation in higher education mediated by organizational learning. *Studies in Higher Education, 41*(7), 1153-1166.

Jiménez-Jiménez, D., Martínez-Costa, M., & Para-Gonzalez, L. (2020). Implications of TQM in firm's innovation capability. *International Journal of Quality & Reliability Management, 37*(2), 279-304.

Koomson, S. (2024). Do total quality management and external factors matter? The effect of innovation behaviour on innovation performance in banks. *European Business Review*, (ahead-of-print).

Mueller, F., & Carter, C. (2005). The scripting of total quality management within its organizational biography. *Organization Studies, 26*(2), 221-247.

Mushtaq, N., Hussain, F., Dad, A., Rehman, S. U., & Waseem, M. (2023). Digital transformation and its impact on business performance in SMEs of Pakistan: an empirical study. *The Asian Bulletin of Big Data Management, 3*(2), 103-114.

Nair, A. J., Manohar, S., & Mittal, A. (2024). Reconfiguration and transformation for resilience: building service organizations towards sustainability. *Journal of Services Marketing, 38*(4), 404-425.

Nasim, I., Ahmad, R., Bashir, F., & Noreen, S. (2022). Trade openness as a determinant of sectoral growth in Pakistan: A time series analysis. Review of Education, *Administration & Law, 5*(2), 73-83.

Naz, S., Haq, N. U., & Nasir, S. (2022). Capabilities pathway to firm performance: moderating role of environmental dynamism in the food manufacturing firms of Pakistan. *International Journal of Innovation Management, 26*(04), 2250030.

Ainin Zakiah, O., & Nur Balqishanis, Z. A. (2024). Investigating determinants of innovation performance maturity in Malaysian private universities: A partial least squares structural equation modelling analysis.

Papaioannou, A., Koronios, K., Ntasis, L., Yfantidou, G., Balaska, P., & Spyridopoulou, E. (2024). Total quality management in sport tourism and the hospitality industry: The case of Greek luxury resorts with sport and recreation facilities and services. *Sustainability, 16*(5), 1894.

Petrillo, A., Rehman, M., & Baffo, I. (2024). Digital and Sustainable Transition in Textile Industry through Internet of Things Technologies: A Pakistani Case Study. *Applied Sciences, 14*(13), 5380.

Qureshi, A. M., Nawaz, A. H., & Khan, N. (2022). Role of total quality management towards organizational performance through knowledge transfer and innovation capabilities. Gomal University Journal of Research, 38(4), 428-436.

Raj, R., Kumar, V., Bolatan, G. I., & Daim, T. (2024). Strategic conceptualization and operationalization of digital orientation to support organizational TQM performance. Total Quality Management & Business Excellence, 35(7-8), 784-813.

Saleh, Y., Zaid, A. A., & Omar, R. (2024). The impact of total quality management practices on innovation in food SMEs: the mediating role of organizational culture. 5, (ahead-of-print).

Shuaib, K. M., & He, Z. (2023). Moderating role of organizational culture in the relationship between total quality management and organizational innovation among manufacturing SMEs in Nigeria. *African Journal of Science, Technology, Innovation and Development, 15*(6), 743-766.

Sotirelis, P., & Grigoroudis, E. (2021). Total quality management and innovation: Linkages and evidence from the agro-food industry. *Journal of the Knowledge Economy, 12*(4), 1553-1573.

Texeira-Quiros, J., Justino, M. D. R., Antunes, M. G., Mucharreira, P. R., & Nunes, A. D. T. (2022). Effects of innovation, total quality management, and internationalization on organizational performance of higher education institutions. *Frontiers in Psychology, 13*, 869638.

Tonjang, S., & Thawesaengskulthai, N. (2022). Total quality and innovation management in healthcare (TQIM-H) for performance and sustainability. *IEEE Transactions on Engineering Management, 71*, 5242-5260.