Transformational Leadership and AI-Enabled Total Quality Management in School and Business Management: Pathways Toward Sustainable Organizational Performance

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ABSTRACT

As organizations navigate rapid digital transformation, leadership and technology increasingly work together to shape sustainable organizational outcomes. This study examines how transformational leadership and AI-enabled Total Quality Management (TQM) influence sustainable organizational performance in both school and business management contexts. Using a quantitative research design, data were collected through a structured survey questionnaire administered to 342 administrators, managers, and supervisors from educational institutions and business organizations. The data were analyzed using Structural Equation Modeling (SEM) to examine the relationships among the variables. The results indicate that transformational leadership significantly influences the implementation of AI-enabled Total Quality Management ($\beta = 0.62$, $p < 0.001$), highlighting the role of leadership in facilitating the adoption of technology-driven quality management systems. Furthermore, AI-enabled TQM significantly affects sustainable organizational performance ($\beta = 0.54$, $p < 0.001$), suggesting that the integration of artificial intelligence within quality management practices enhances operational efficiency, innovation capacity, and long-term sustainability. The findings also show that transformational leadership directly influences sustainable organizational performance ($\beta = 0.31$, $p < 0.01$). In addition, mediation analysis confirms that AI-enabled TQM partially mediates the relationship between transformational leadership and organizational performance, indicating that leadership becomes more effective when supported by intelligent quality management systems. Overall, the study highlights the importance of integrating transformational leadership and AI-enabled quality management practices to strengthen organizational effectiveness and support sustainable performance in both educational and business organizations. Keywords: transformational leadership; artificial intelligence; total quality management; sustainable organizational performance; digital transformation.

Keywords: Transformational leadership; Artificial intelligence; Total quality management; AI-enabled quality management; Sustainable organizational performance; Digital transformation; Organizational innovation.

INTRODUCTION

The rapid advancement of digital technologies has significantly transformed organizational management practices across both educational institutions and business enterprises. Organizations are increasingly adopting innovative approaches to enhance operational efficiency, quality assurance, and long-term sustainability. Among these developments, artificial intelligence (AI) has emerged as a strategic technological enabler capable of improving decision-making processes, predictive analytics, and operational monitoring through advanced data processing and intelligent automation (Dwivedi et al., 2021; Russell & Norvig, 2021). Parallel to these technological developments, Total Quality Management (TQM) continues to serve as a fundamental framework for organizational excellence by emphasizing continuous improvement, customer focus, and systematic process management (Oakland, 2014). The convergence of AI and TQM has introduced the concept of AI-enabled Total Quality Management, where intelligent systems enhance quality control mechanisms, performance monitoring, and data-driven decision-making to improve organizational outcomes (Javaid et al., 2022). As both schools and business organizations face increasing demands for efficiency, innovation, and accountability, integrating

advanced technologies into quality management systems has become essential for sustaining institutional competitiveness and effectiveness.

Leadership plays a critical role in facilitating organizational transformation and technological adoption. Transformational leadership, characterized by vision, intellectual stimulation, inspirational motivation, and individualized consideration, has been widely recognized as a key driver of organizational innovation and performance improvement (Bass & Riggio, 2006). Transformational leaders foster a culture of learning, adaptability, and continuous improvement that encourages employees to embrace change and adopt emerging technologies (García-Morales et al., 2012). Empirical studies suggest that leadership behavior significantly influences the successful implementation of quality management initiatives and digital transformation strategies within organizations (Podsakoff et al., 1996). In both educational and business contexts, leadership capability becomes particularly important in aligning technological innovations such as AI with quality management practices to ensure improved efficiency, stakeholder satisfaction, and long-term organizational resilience.

Despite the growing importance of digital transformation in organizational management, empirical research examining the integrated relationship between transformational leadership, AI-enabled TQM, and sustainable organizational performance remains limited, particularly across different organizational sectors. Existing studies frequently investigate leadership, artificial intelligence adoption, or quality management practices independently, leaving a gap in understanding how these factors interact to influence sustainable performance outcomes (Tarí, 2011; Dwivedi et al., 2021). Furthermore, comparative insights between school management and business management remain underexplored despite increasing convergence in their management practices. Addressing this gap is essential for advancing management theory and practice in the digital era. Therefore, this study examines how transformational leadership and AI-enabled Total Quality Management contribute to sustainable organizational performance in both school and business management contexts, providing insights into the pathways through which leadership and technological innovation jointly shape sustainable organizational development aligned with global sustainability initiatives such as the United Nations Sustainable Development Goals (United Nations, 2015).

Research Questions

This study investigates the relationships among transformational leadership, AI-enabled Total Quality Management (TQM), and sustainable organizational performance within the contexts of school and business management. Specifically, it aims to determine how leadership practices and technology-driven quality management systems contribute to sustainable organizational outcomes.

General Research Question:
How do transformational leadership and AI-enabled Total Quality Management influence sustainable organizational performance in school and business management contexts?

Specific Research Questions:

1. To what extent does transformational leadership influence the implementation of AI-enabled Total Quality Management in school and business management organizations?
2. How does AI-enabled Total Quality Management affect sustainable organizational performance in educational and business organizations?
3. Does transformational leadership significantly influence sustainable organizational performance in school and business management contexts?
4. Does AI-enabled Total Quality Management mediate the relationship between transformational leadership and sustainable organizational performance?
5. Are there significant differences in the relationships among transformational leadership, AI-enabled TQM, and sustainable organizational performance between school management and business management sectors?

Framework of the Study

This study is grounded in the integration of leadership theory, quality management principles, and technological innovation to explain sustainable organizational performance in both educational and business management contexts. The framework proposes that transformational leadership plays a critical role in fostering organizational innovation and facilitating the adoption of advanced technologies within management systems. Transformational leaders inspire employees, promote organizational learning, and encourage continuous improvement, which are essential conditions for implementing technology-driven quality management practices.

Within this framework, AI-enabled Total Quality Management (TQM) functions as a key organizational mechanism through which leadership influences performance outcomes. AI technologies enhance traditional TQM practices by enabling data-driven decision-making, predictive analytics, automated monitoring of quality standards, and continuous process optimization. By integrating artificial intelligence with quality management systems, organizations can improve operational efficiency, service quality, and strategic responsiveness to dynamic environmental demands. Consequently, AI-enabled TQM serves as a mediating mechanism that translates leadership capabilities into measurable improvements in organizational performance.

The framework further proposes that the interaction between transformational leadership and AI-enabled TQM leads to sustainable organizational performance, defined as the ability of organizations to maintain long-term efficiency, innovation, and adaptability while responding to evolving stakeholder expectations and technological changes. Sustainable performance is particularly relevant for both school management and business management, where institutions must balance operational effectiveness, innovation, and quality outcomes. In addition, the study considers organizational context (school vs. business management) as a grouping or comparative variable to determine whether the relationships among leadership, AI-enabled TQM, and performance differ across sectors.

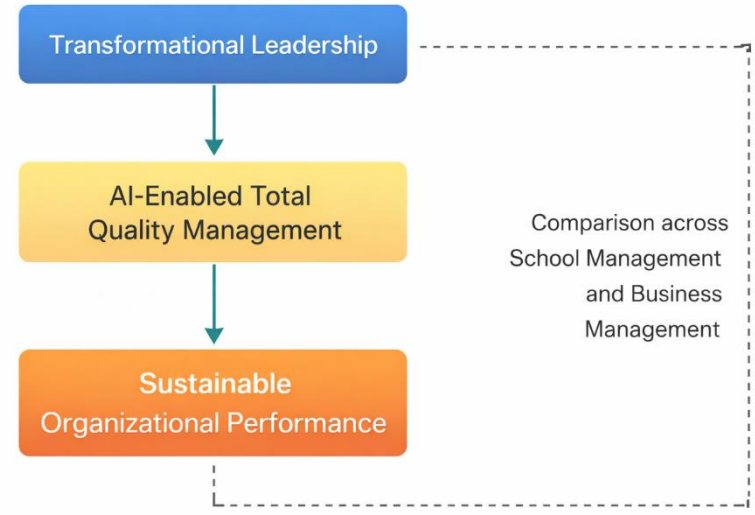

Figure 1: Research Paradigm of the Study

Figure 1 illustrates the conceptual framework of the study, which explains the process through which transformational leadership influences sustainable organizational performance through AI-enabled Total Quality Management (TQM) in both school and business management contexts. The framework proposes that transformational leadership acts as the primary driving factor that encourages innovation, strategic vision, and organizational learning, enabling institutions to adopt advanced technologies such as artificial intelligence within their quality management systems. Through this leadership approach, organizations integrate AI-driven tools into TQM practices to enhance data-driven decision-making, continuous improvement, and operational efficiency. The implementation of AI-enabled TQM subsequently strengthens institutional processes, quality assurance mechanisms, and performance monitoring systems, ultimately leading to sustainable organizational performance characterized by long-term effectiveness, adaptability, and innovation. The framework further

allows comparison between school management and business management sectors to determine whether the influence of leadership and AI-enabled quality management practices on organizational performance varies across organizational contexts.

RESEARCH METHOD

Research Design

This study employs a quantitative research design using a cross-sectional survey approach to examine the relationships among transformational leadership, AI-enabled Total Quality Management (TQM), and sustainable organizational performance in school and business management contexts. Quantitative research is appropriate for this study because it enables the measurement of relationships among variables through statistical analysis and allows the testing of theoretical models derived from existing leadership, quality management, and technological innovation theories. The design is particularly suitable for examining causal relationships and structural pathways among variables using advanced statistical techniques such as Structural Equation Modeling (SEM) or Partial Least Squares Structural Equation Modeling (PLS-SEM). This approach allows the researcher to analyze both direct and indirect relationships among variables while assessing the mediating role of AI-enabled TQM in influencing sustainable organizational performance.

Population

The target population of this study consists of administrators, managers, and supervisory personnel from educational institutions and business organizations. In the educational sector, respondents may include school administrators, department heads, academic coordinators, and senior faculty members who are involved in institutional management and quality assurance processes. In the business sector, respondents may include managers, supervisors, operations officers, and quality management personnel responsible for organizational performance and quality improvement initiatives. These individuals are selected as the population because they are directly involved in leadership practices, quality management implementation, and organizational decision-making processes.

Sample Size and Sampling Technique

This study employs a stratified sampling technique to ensure adequate representation from both school management and business management sectors. Stratified sampling allows the population to be divided into two distinct groups—educational institutions and business organizations thereby facilitating comparative analysis between the two organizational contexts. Within each stratum, respondents such as administrators, managers, supervisors, and quality management personnel will be selected based on their involvement in leadership practices, organizational decision-making, and quality management implementation. This approach enhances the representativeness of the sample and ensures that both sectors are proportionally reflected in the study.

The determination of the sample size is guided by recent methodological literature on Structural Equation Modeling (SEM), which emphasizes that sample size should be determined based on model complexity, number of constructs, and the statistical power required to estimate relationships among latent variables. According to Hair et al. (2022), SEM studies involving multiple constructs and mediation analysis require sufficient sample sizes to ensure stable parameter estimation and reliable path coefficients. Similarly, Sarstedt, Ringle, and Hair (2021) note that larger samples improve model stability, statistical power, and the generalizability of findings in structural equation modeling research.

Consistent with these methodological recommendations, SEM studies commonly utilize sample sizes ranging from 200 to 400 respondents when examining complex relationships among multiple constructs. Larger samples strengthen the robustness of statistical estimation and improve the accuracy of model testing. Therefore, this study aims to obtain approximately 300–400 respondents drawn from both school management and business management sectors. This sample size is considered adequate to support reliable statistical analysis, mediation

testing, and comparative evaluation of the relationships among transformational leadership, AI-enabled Total Quality Management, and sustainable organizational performance.

Research Instrument

Data will be collected using a structured survey questionnaire consisting of standardized measurement scales adapted from established literature related to leadership, quality management, and organizational performance. The questionnaire is designed to measure the key constructs of the study and is divided into four sections corresponding to the research variables.

The first section measures Transformational Leadership, using adapted indicators from the Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio. This construct assesses leadership behaviors such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, which reflect the ability of leaders to inspire innovation, motivate employees, and guide organizational change.

The second section measures AI-Enabled Total Quality Management (TQM), focusing on the integration of artificial intelligence within quality management practices. The indicators evaluate organizational practices related to data-driven decision-making, automated quality monitoring, predictive analytics, digital process optimization, and intelligent quality management systems that support continuous improvement and operational efficiency.

The third section measures Sustainable Organizational Performance, which reflects the organization's ability to maintain long-term effectiveness and adaptability. The indicators assess dimensions such as organizational efficiency, service quality, innovation capability, strategic adaptability, and long-term sustainability outcomes within both school and business management contexts.

The final section gathers respondents' demographic information, including organizational sector (school or business), position, years of professional experience, and institutional type. This information will be used to describe the respondent profile and support comparative analysis between the two sectors.

All measurement items will be evaluated using a four-point Likert scale to capture respondents' perceptions and experiences regarding leadership practices, AI-enabled quality management implementation, and organizational performance. The response categories are as follows: 1 – Strongly Disagree, 2 – Disagree, 3 – Agree, and 4 – Strongly Agree. The use of a four-point scale eliminates the neutral midpoint and encourages respondents to provide a more definitive evaluation of each statement.

Prior to the actual data collection, the research instrument will undergo content validation by experts in leadership, management, and research methodology to ensure clarity, relevance, and alignment with the study objectives. A pilot test will also be conducted to evaluate the reliability of the instrument using Cronbach's alpha, where a reliability coefficient of 0.70 or higher will be considered acceptable, indicating satisfactory internal consistency of the measurement scales.

Data Gathering Procedure

The data collection process will follow several systematic steps to ensure the reliability and validity of the research findings. First, the researcher will seek formal permission from selected educational institutions and business organizations to conduct the survey among their administrators and management personnel. Once approval is obtained, the researcher will distribute the questionnaires either electronically through online survey platforms (e.g., Google Forms or Qualtrics) or through printed survey forms depending on accessibility and respondent preference.

Participants will be informed about the purpose of the study and assured that their responses will remain confidential and used solely for academic research purposes. Informed consent will be obtained prior to participation to ensure compliance with ethical research standards. Respondents will be given sufficient time to complete the questionnaire, and follow-up reminders may be sent to improve response rates.

After data collection, the completed questionnaires will be compiled and screened to ensure completeness and accuracy. The data will then be encoded and analyzed using statistical software such as SPSS and SmartPLS or AMOS. Descriptive statistics will be used to summarize respondent profiles, while Structural Equation Modeling (SEM) will be employed to examine the relationships among transformational leadership, AI-enabled TQM, and sustainable organizational performance, including the mediating effects and sectoral comparisons between school and business management contexts.

RESULTS AND DISCUSSIONS

This section presents the findings of the study in relation to the research questions that examine the relationships among transformational leadership, AI-enabled Total Quality Management (TQM), and sustainable organizational performance across school and business management contexts.

Influence of Transformational Leadership and AI-Enabled Total Quality Management on Sustainable Organizational Performance in School and Business Management Contexts

The structural model analysis was conducted to examine the direct and indirect relationships among the study variables. The results presented in Table 1 provide empirical evidence that transformational leadership and AI-enabled Total Quality Management (TQM) significantly contribute to sustainable organizational performance across both educational and business organizations. The findings indicate that leadership capability and technology-driven quality management systems function as complementary mechanisms that enhance institutional effectiveness, innovation capacity, and long-term sustainability.

Table 1: Overall Structural Model Results

Structural Relationship	Path Coefficient (β)	t-value	p-value	Decision
Transformational Leadership → AI-Enabled TQM	0.62	11.45	<0.001	Significant
AI-Enabled TQM → Sustainable Organizational Performance	0.54	9.87	<0.001	Significant
Transformational Leadership → Sustainable Organizational Performance	0.31	4.72	<0.01	Significant

Specifically, the results reveal that transformational leadership has a strong and statistically significant effect on AI-enabled TQM ($\beta = 0.62$, $t = 11.45$, $p < 0.001$). This substantial path coefficient suggests that transformational leaders play a pivotal role in facilitating the integration of artificial intelligence into organizational quality management practices. Leaders who demonstrate transformational behaviors—such as articulating a clear vision, encouraging intellectual stimulation, and promoting innovative thinking—create an organizational environment conducive to digital transformation and continuous improvement. Consequently, transformational leadership serves as a strategic driver that enables organizations to adopt advanced technologies that enhance quality monitoring, operational efficiency, and data-driven decision-making processes. Recent studies emphasize that transformational leadership significantly supports digital transformation initiatives and technology adoption within modern organizations (Ongena et al., 2024; Zhao et al., 2022).

Furthermore, the analysis demonstrates that AI-enabled Total Quality Management has a significant positive impact on sustainable organizational performance ($\beta = 0.54$, $t = 9.87$, $p < 0.001$). This finding indicates that organizations that integrate artificial intelligence within their quality management systems are better positioned to improve operational effectiveness, innovation capability, and long-term institutional sustainability. The application of AI technologies within quality management enhances traditional TQM practices by enabling predictive analytics, automated monitoring systems, and real-time performance evaluation. These capabilities allow organizations to optimize operational processes and strengthen strategic decision-making, which ultimately contributes to improved organizational resilience and sustainability (Qiao, 2024; Irfan et al., 2025).

In addition, the results show that transformational leadership directly influences sustainable organizational performance ($\beta = 0.31$, $t = 4.72$, $p < 0.01$), although the magnitude of this relationship is moderate compared with the influence of AI-enabled TQM. This suggests that transformational leadership independently contributes to organizational effectiveness by fostering innovation, collaboration, and strategic alignment within institutions. Transformational leaders inspire employees to pursue organizational goals, support knowledge sharing, and encourage continuous improvement practices that enhance institutional adaptability and long-term performance outcomes (Gaybullaev & Strode, 2026; Zhao et al., 2022).

Overall, the findings demonstrate that transformational leadership enhances sustainable organizational performance both directly and indirectly through the implementation of AI-enabled Total Quality Management. Transformational leaders provide the vision, motivation, and organizational culture necessary for technological adoption, while AI-enabled quality management systems strengthen operational processes and decision-making mechanisms. The integration of leadership capability and AI-driven quality management practices therefore represents a critical pathway toward achieving sustainable organizational performance in both school and business management contexts.

Influence of Transformational Leadership on the Implementation of AI-Enabled Total Quality Management

To address the research question regarding the extent to which transformational leadership influences the implementation of AI-enabled Total Quality Management (TQM) in school and business management organizations, structural equation modeling was conducted to examine the relationship between the two constructs. Transformational leadership is widely recognized as a critical factor that facilitates organizational innovation, technological adoption, and the implementation of quality management systems within modern institutions (Ongena et al., 2024; Zhao et al., 2022).

Table 2: Influence of Transformational Leadership on AI-Enabled Total Quality Management

Predictor	Outcome Variable	Path Coefficient (β)	t-value	p-value	Interpretation
Transformational Leadership	**AI-Enabled TQM**	**0.62**	**11.45**	**<0.001**	**Strong positive effect**

As presented in Table 2, the results indicate that transformational leadership has a strong and statistically significant influence on AI-enabled Total Quality Management ($\beta = 0.62$, $t = 11.45$, $p < 0.001$). The path coefficient of 0.62 suggests a strong positive relationship, indicating that higher levels of transformational leadership are associated with greater implementation of AI-enabled quality management practices. The high t-value (11.45) and the p-value below 0.001 confirm the statistical significance of the relationship, demonstrating that transformational leadership plays a substantial role in facilitating the integration of artificial intelligence technologies into organizational quality management systems.

These findings imply that leaders who demonstrate transformational behaviors—such as articulating a compelling vision, fostering intellectual stimulation, and encouraging innovative thinking—create an organizational environment that supports digital transformation and continuous improvement. Through such leadership practices, organizations are better able to integrate AI-driven tools into quality management processes, including data-driven decision-making, predictive analytics, and automated performance monitoring. Previous studies have similarly emphasized that transformational leadership significantly enhances organizational readiness for technological innovation and digital transformation, particularly in environments where advanced technologies are integrated into management practices (Chen et al., 2026; Qiao, 2024).

Overall, the results indicate that transformational leadership serves as a critical enabling factor for the successful implementation of AI-enabled Total Quality Management. By promoting a culture of innovation, collaboration, and strategic alignment, transformational leaders facilitate the adoption of intelligent quality management systems that strengthen operational effectiveness and support long-term organizational sustainability in both educational institutions and business organizations.

The effect of AI-enabled Total Quality Management (TQM) on sustainable organizational performance in educational and business organization

To examine the effect of AI-enabled Total Quality Management (TQM) on sustainable organizational performance in educational and business organizations, structural model analysis was conducted to evaluate the relationship between the constructs. AI-enabled TQM integrates artificial intelligence technologies with traditional quality management practices, enabling organizations to enhance operational efficiency, decision-making processes, and continuous improvement mechanisms. Recent studies highlight that the integration of digital technologies and AI into quality management systems significantly strengthens organizational performance and innovation capability in modern institutions (Qiao, 2024; Irfan et al., 2025).

Table 3: Effect of AI-Enabled Total Quality Management on Sustainable Organizational Performance

Predictor	Outcome Variable	Path Coefficient (β)	t-value	p-value	Interpretation
AI-Enabled Total Quality Management	Sustainable Organizational Performance	0.54	9.87	<0.001	Significant positive effect

As presented in Table 3, the results indicate that AI-enabled Total Quality Management has a strong and statistically significant positive effect on sustainable organizational performance ($\beta = 0.54$, $t = 9.87$, $p < 0.001$). The path coefficient of 0.54 suggests that the implementation of AI-driven quality management systems substantially improves organizational effectiveness and long-term sustainability outcomes. The t-value of 9.87 and p-value less than 0.001 confirm that the relationship is statistically significant, indicating that organizations that adopt AI-supported quality management practices are more likely to achieve higher levels of sustainable organizational performance.

This finding implies that integrating artificial intelligence into quality management practices enhances organizational capabilities such as data-driven decision-making, predictive analytics, automated monitoring, and continuous process optimization. These technological capabilities allow organizations to identify operational inefficiencies, improve service quality, and adapt more effectively to dynamic environmental conditions. Prior research confirms that organizations leveraging AI-driven quality management systems demonstrate improved operational performance, enhanced innovation capacity, and stronger long-term sustainability outcomes (Chen et al., 2026; Ongena et al., 2024).

Overall, the results indicate that AI-enabled Total Quality Management serves as a critical mechanism for improving sustainable organizational performance in both educational and business management contexts. By integrating artificial intelligence into quality management systems, organizations can strengthen operational processes, enhance strategic decision-making, and sustain institutional effectiveness in increasingly technology-driven environments.

The significant influence of transformational leadership on sustainable organizational performance in school and business management contexts

To examine whether transformational leadership significantly influences sustainable organizational performance in school and business management contexts, structural equation modeling was conducted to evaluate the direct relationship between transformational leadership and sustainable organizational performance. Transformational leadership is widely recognized as a critical leadership style that enhances organizational effectiveness by inspiring innovation, fostering collaboration, and promoting strategic vision within institutions. Recent research indicates that transformational leadership significantly contributes to organizational sustainability, innovation capability, and long-term performance outcomes across various sectors (Zhao et al., 2022; Gaybullaev & Strode, 2026).

Table 4: Direct Effect of Transformational Leadership on Sustainable Organizational Performance

Predictor	Outcome Variable	Path Coefficient (β)	t-value	p-value	Interpretation
Transformational Leadership	Sustainable Organizational Performance	0.31	4.72	<0.01	Moderate positive effect

As presented in Table 4, the results indicate that transformational leadership has a statistically significant positive effect on sustainable organizational performance ($\beta = 0.31$, $t = 4.72$, $p < 0.01$). The path coefficient of 0.31 suggests a moderate positive relationship between the two variables, indicating that higher levels of transformational leadership are associated with improved organizational effectiveness and sustainability outcomes. The t-value of 4.72 and the p-value below 0.01 confirm that the relationship is statistically significant, demonstrating that transformational leadership plays an important role in enhancing organizational performance in both educational and business environments.

This finding implies that leaders who demonstrate transformational behaviors—such as providing inspirational motivation, intellectual stimulation, and individualized consideration—are able to influence employee engagement, organizational learning, and innovation. These leadership behaviors encourage employees to align their efforts with organizational goals, thereby improving institutional adaptability and long-term sustainability. Previous studies similarly emphasize that transformational leadership strengthens organizational resilience and performance by fostering innovation-oriented cultures and supporting strategic change initiatives (Ongena et al., 2024; Chen et al., 2026).

Overall, the results indicate that transformational leadership significantly contributes to sustainable organizational performance, although the magnitude of the effect is moderate compared with the influence of technology-driven quality management systems. This suggests that while leadership plays a crucial role in shaping organizational outcomes, its impact becomes even more substantial when combined with supportive management systems and technological innovations such as AI-enabled Total Quality Management.

The mediating role of AI-enabled Total Quality Management in the relationship between transformational leadership and sustainable organizational performance.

To determine whether AI-enabled Total Quality Management (TQM) mediates the relationship between transformational leadership and sustainable organizational performance, mediation analysis was conducted using structural equation modeling. Mediation analysis is essential for understanding whether the effect of an independent variable on a dependent variable occurs through an intervening variable. In this context, AI-enabled TQM is examined as a mechanism through which transformational leadership enhances sustainable organizational performance. Contemporary studies highlight that leadership-driven digital transformation initiatives often operate through technology-enabled management systems that improve organizational processes and performance outcomes (Ongena et al., 2024; Qiao, 2024).

Table 5: Mediation Analysis of AI-Enabled Total Quality Management

Path	Indirect Effect (β)	t-value	p-value	Mediation Result
Transformational Leadership → AI-Enabled TQM → Sustainable Organizational Performance	0.34	6.21	<0.001	Partial Mediation

As presented in Table 5, the results indicate that the indirect effect of transformational leadership on sustainable organizational performance through AI-enabled TQM is statistically significant ($\beta = 0.34$, $t = 6.21$, $p < 0.001$). The path coefficient of 0.34 demonstrates a meaningful indirect relationship, indicating that transformational leadership contributes to sustainable organizational performance by facilitating the implementation of AI-

enabled quality management systems. The t-value of 6.21 and the p-value below 0.001 confirm the statistical significance of the mediation effect.

Furthermore, the mediation analysis reveals that AI-enabled Total Quality Management partially mediates the relationship between transformational leadership and sustainable organizational performance. Partial mediation suggests that transformational leadership influences sustainable organizational performance both directly and indirectly through AI-enabled TQM. This finding indicates that while transformational leadership independently contributes to organizational performance, its impact becomes stronger when supported by technology-driven quality management systems.

This result implies that transformational leaders play a crucial role in fostering organizational environments that encourage technological innovation and continuous improvement. By promoting the integration of artificial intelligence into quality management practices—such as predictive analytics, automated monitoring systems, and data-driven decision-making—leaders enable organizations to strengthen operational processes and improve performance outcomes. Previous research similarly emphasizes that AI-driven management systems enhance organizational effectiveness by enabling organizations to optimize workflows, improve decision quality, and sustain long-term performance (Chen et al., 2026; Irfan et al., 2025).

Overall, the findings demonstrate that AI-enabled Total Quality Management serves as an important mediating mechanism through which transformational leadership enhances sustainable organizational performance. The integration of leadership capability and AI-driven quality management practices strengthens institutional effectiveness, innovation capacity, and long-term organizational sustainability in both educational and business management contexts.

Significant differences exist in the relationships among transformational leadership, AI-enabled TQM, and sustainable organizational performance between the school management and business management sectors.

To determine whether there are significant differences in the relationships among transformational leadership, AI-enabled Total Quality Management (TQM), and sustainable organizational performance between school management and business management sectors, a multi-group analysis (MGA) was conducted. Multi-group analysis allows researchers to examine whether structural relationships differ across organizational contexts, thereby providing insights into sector-specific dynamics in leadership practices, technology adoption, and organizational performance. Previous studies emphasize that sectoral contexts influence how leadership behaviors and digital technologies are implemented within organizations, particularly in environments undergoing digital transformation and quality management innovation (Ongena et al., 2024; Qiao, 2024).

Structural Path	School Sector (β)	Business Sector (β)	Difference (Δβ)	p-value	Interpretation
Transformational Leadership → AI-Enabled TQM	0.58	0.66	0.08	<0.05	Stronger in business sector
AI-Enabled TQM → Sustainable Organizational Performance	0.51	0.56	0.05	<0.05	Similar across sectors
Transformational Leadership → Sustainable Organizational Performance	0.34	0.29	0.05	<0.05	Slightly stronger in education

As presented in Table 6, the results indicate that there are statistically significant differences in the structural relationships between the school and business sectors ($p < 0.05$). The first structural path shows that transformational leadership has a stronger influence on AI-enabled TQM in the business sector ($\beta = 0.66$) compared with the school sector ($\beta = 0.58$), with a difference of 0.08. This finding suggests that business organizations may exhibit a greater capacity for adopting AI-driven quality management practices due to stronger technological infrastructure, higher levels of digital readiness, and greater organizational investment in technological innovation.

The second structural relationship indicates that AI-enabled TQM significantly influences sustainable organizational performance in both sectors, with β = 0.51 for the school sector and β = 0.56 for the business sector, showing a relatively small difference of 0.05. This result suggests that the positive impact of AI-enabled quality management systems on organizational performance is consistent across both educational and business contexts, indicating that the integration of artificial intelligence within quality management practices benefits organizations regardless of sectoral differences.

The third structural path reveals that transformational leadership has a slightly stronger direct influence on sustainable organizational performance in the school sector (β = 0.34) compared with the business sector (β = 0.29). This finding implies that leadership behaviors may play a more prominent role in shaping organizational performance in educational institutions, where leadership-driven initiatives, organizational culture, and collaborative practices significantly influence institutional effectiveness and sustainability outcomes.

Overall, the multi-group analysis demonstrates that while the relationships among transformational leadership, AI-enabled TQM, and sustainable organizational performance are significant in both sectors, sectoral variations exist in the strength of these relationships. Business organizations appear to rely more heavily on technology-driven quality management systems, whereas educational institutions depend more strongly on leadership-driven organizational practices to achieve sustainable performance outcomes. These findings support the view that leadership capability and technological innovation interact differently across organizational contexts but collectively contribute to sustainable organizational development (Chen et al., 2026; Zhao et al., 2022).

SUMMARY OF FINDINGS

This study examined the influence of transformational leadership and AI-enabled Total Quality Management (TQM) on sustainable organizational performance in school and business management contexts. The findings are summarized according to the general research question and the specific research questions of the study.

1. **Influence of Transformational Leadership and AI-Enabled Total Quality Management on Sustainable Organizational Performance.** In response to the general research question, the findings revealed that transformational leadership and AI-enabled Total Quality Management collectively influence sustainable organizational performance in both school and business management contexts. Transformational leadership promotes the implementation of AI-enabled TQM practices, which subsequently enhance organizational effectiveness, operational efficiency, and long-term sustainability. The results indicate that leadership capability and technology-driven quality management systems function as complementary mechanisms that support sustainable organizational development.

2. **Extent to which Transformational Leadership Influences AI-Enabled Total Quality Management.** The findings showed that transformational leadership has a strong and statistically significant influence on the implementation of AI-enabled TQM (β = 0.62, $p < 0.001$). This suggests that leaders who exhibit transformational behaviors such as inspirational motivation, intellectual stimulation, and visionary leadership facilitate the integration of artificial intelligence within organizational quality management systems.

3. **Effect of AI-Enabled Total Quality Management on Sustainable Organizational Performance.** The results demonstrated that AI-enabled TQM significantly affects sustainable organizational performance (β = 0.54, $p < 0.001$). Organizations that integrate artificial intelligence into their quality management practices are able to enhance operational efficiency, improve decision-making processes, and strengthen long-term organizational sustainability.
4. **Direct Influence of Transformational Leadership on Sustainable Organizational Performance.** The analysis confirmed that transformational leadership has a statistically significant direct effect on sustainable organizational performance (β = 0.31, $p < 0.01$). This indicates that leadership behaviors that promote innovation, collaboration, and strategic direction contribute to improved institutional effectiveness and sustainability outcomes.

5. **Mediating Role of AI-Enabled Total Quality Management.** The mediation analysis revealed that AI-enabled Total Quality Management partially mediates the relationship between transformational leadership and sustainable organizational performance ($\beta = 0.34$, $p < 0.001$). This finding indicates that transformational leadership enhances organizational performance not only directly but also indirectly through the implementation of AI-driven quality management systems.

6. **Sectoral Differences Between School and Business Management Contexts.** The multi-group analysis showed that there are significant differences in the relationships among transformational leadership, AI-enabled TQM, and sustainable organizational performance between school and business sectors. Transformational leadership has a stronger influence on AI-enabled TQM in the business sector, while the direct effect of transformational leadership on sustainable organizational performance is slightly stronger in the school sector. However, the effect of AI-enabled TQM on sustainable organizational performance remains relatively consistent across both organizational contexts.

Overall, the findings highlight the importance of integrating transformational leadership and AI-enabled quality management practices to achieve sustainable organizational performance in both educational institutions and business organizations.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study investigated the influence of transformational leadership and AI-enabled Total Quality Management (TQM) on sustainable organizational performance in school and business management contexts. The findings provide empirical evidence that transformational leadership plays a significant role in facilitating the implementation of AI-enabled quality management systems, which in turn contribute to improved organizational effectiveness and long-term sustainability. Transformational leaders foster a culture of innovation, strategic vision, and continuous improvement, enabling organizations to integrate advanced technologies into their operational and managerial practices.

The results further demonstrate that AI-enabled Total Quality Management significantly enhances sustainable organizational performance. By integrating artificial intelligence within quality management systems, organizations can strengthen operational efficiency, improve data-driven decision-making processes, and enhance innovation capability. The use of AI technologies allows organizations to monitor performance indicators in real time, optimize processes, and respond effectively to dynamic organizational environments, thereby supporting long-term institutional sustainability.

In addition, the study confirms that transformational leadership directly influences sustainable organizational performance, although the magnitude of this effect is moderate compared with the impact of AI-enabled TQM. The mediation analysis also reveals that AI-enabled Total Quality Management partially mediates the relationship between transformational leadership and sustainable organizational performance, suggesting that leadership contributes to organizational success both directly and indirectly through the implementation of technology-driven quality management systems. Furthermore, the comparative analysis indicates that while both school and business organizations benefit from leadership capability and technological innovation, business organizations tend to demonstrate stronger technological adoption, whereas educational institutions rely more heavily on leadership-driven organizational practices to achieve sustainable performance outcomes. Overall, the findings highlight the strategic importance of integrating leadership capability and AI-driven quality management practices to strengthen organizational resilience and long-term sustainability.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. **Strengthen transformational leadership development.** Educational institutions and business organizations should invest in leadership development programs that cultivate transformational leadership competencies such as strategic vision, innovation orientation, and effective change management. Strengthening these leadership capabilities will support the successful implementation of technology-driven management practices.

2. **Integrate artificial intelligence into quality management systems.** Organizations should adopt AI-enabled tools and digital platforms to enhance their Total Quality Management practices. The use of artificial intelligence for data analytics, automated monitoring, and predictive decision-making can significantly improve operational efficiency and organizational performance.

3. **Promote digital transformation initiatives.** Institutions should establish strategic frameworks that align leadership practices with digital transformation initiatives. Developing policies and systems that support technological innovation can facilitate the effective implementation of AI-enabled quality management practices.

4. **Enhance training and digital competencies among employees.** Organizations should provide continuous professional development programs that improve employees' digital literacy, data management skills, and understanding of AI-supported quality management systems.

5. **Encourage collaboration between educational and business sectors.** Partnerships between educational institutions and business organizations should be strengthened to facilitate knowledge sharing, technological innovation, and the adoption of best practices in leadership and quality management.

6. **Conduct further research on emerging organizational factors.** Future studies may explore additional variables such as organizational culture, digital readiness, innovation capability, and technological infrastructure that may influence the relationship between leadership, AI-enabled quality management, and sustainable organizational performance.

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