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Investigating the Mediating Role of Team Communication in the Relationship between Leadership Style and Team Performance in AI-based Interaction Systems Development

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Abstract

This research investigates the complex interplay of leadership styles, team communication, and AI-interaction System development within the context of AI-based interaction systems development teams. The purpose is to elucidate how these variables intersect and collectively influence team performance. By exploring the dynamics specific to AI technologies, the study aims to contribute nuanced insights to the existing literature on leadership in technology-driven environments. Employing a quantitative approach, the study utilizes a structured questionnaire distributed to participants within AI development teams. The research focuses on leadership styles, encompassing both transformational and transactional approaches, team communication dynamics, and the developmental stage of AI-based interaction systems as key variables. Data analysis involves regression, mediation, and moderation analyses, facilitated by SPSS software, to uncover the relationships and interactions among these variables. Findings reveal that both transformational and transactional leadership positively influence team performance, mediated by effective team communication. Additionally, the developmental stage of AI-interaction Systems moderates these effects, highlighting the need for adaptable leadership strategies. This study addresses gaps in existing research by focusing on the specific dynamics within AI development teams, an area previously underexplored. The practical implications are significant for leaders in AI development teams, offering strategies to enhance team collaboration and performance. Key references include Bass and Riggio's work on transformational leadership and Brynjolfsson and McAfee's studies on AI's transformative potential. This research contributes to a nuanced understanding of leadership in technology-driven environments, guiding organizational practices in the AI era.

Keywords: Leadership Style, Information System Functionality, AI-based Interaction System Development, Team Performance, Team Communication.

1 Introduction

The constant pursuit of technical development has led to the disruptive inclusion of AI into various elements of modern society. Growing AI use fosters technological innovation and affects company operations and cooperation (Sjödin et al., 2021). This study examines the complex relationships between

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leadership styles, team communication, AI-based interface technologies, and team effectiveness. Academics and corporate executives navigating AI-era leadership need this work. AI's extensive integration and influence on organizational processes are highlighted in the beginning. Employee engagement solutions driven by AI are improving productivity, creativity, and performance (Borges et al., 2021). As AI becomes more integrated into corporate processes, leadership styles become more important in advising teams on this technical frontier. Leaders must grasp how they affect and adapt to AI development teams due to rapid technological improvement. Leadership styles, team communication, AI-interaction system construction, and team performance are examined in this study to add to the literature. It aims to give business executives valuable information. Based on empirical facts, this research examines technology and leadership literature. Technology-driven leadership literature stresses leadership's impact on team dynamics and outcomes. Traditional research has shown that transformational and transactional leadership styles affect corporate success. AI technology has also prompted scholarly research into how it affects group leadership and collaboration (Galsgaard et al., 2022). However, there is little knowledge regarding how different leadership styles impact team performance in creating AI-based interaction systems and team communication protocols. Due to a dearth of factual information, this research examines AI development team connections. This research seeks to add new perspectives to the AI-era leadership debate. This will be done by incorporating fresh empirical findings and filling a research gap.

Leadership, team dynamics, and AI integration have been studied, laying the groundwork for understanding this article's linkages. Transformational leadership improves team motivation, innovation, and performance (Coronado-Maldonado & Benítez-Márquez, 2023). Transformational leaders may inspire and motivate others by presenting a compelling vision that generates shared purpose and commitment (Eliyana et al., 2019). Transactional leadership, using compensatory incentives and disciplinary measures, has also been connected to task management and goal performance (Lee et al., 2023). As technology-driven workplaces grow, academics are exploring how leadership affects AI project teams. Leaders must adapt to technology, according to studies. Leaders must blend forward-thinking direction with action-oriented techniques (Gemeda & Lee, 2020; Iqbal et al., 2021). Much research has examined team collaboration in technologically advanced settings. Research shows that effective communication promotes teamwork and reduces barriers (Dykhne et al., 2021; White et al., 2023). Technical challenges such as system working, efficiency, and user experience have dominated AI-interaction system development studies (Occhipinti et al., 2022). However, little is known about how leadership styles affect team communication and how AI-interaction systems affect team performance. This study integrates leadership literature, team communication research, and fast evolving AI technologies to address the knowledge gap.

Despite the enormous amount of data, there are still substantial gaps that demand more investigation of the correlations investigated in this article. Previous AI leadership research has ignored the complicated connection between leadership styles, team communication, and AI-connection System development. Some studies have studied how leadership affects technical team dynamics (Irwin et al., 2023), but few have focused on AI development team challenges. This research addresses this shortcoming by addressing the complex ways leadership styles, team communication, and AI-interaction system development impact team success in constructing AI-based interaction systems. Technical issues dominate AI-interaction system research, which ignores human and leadership factors in development teams (Pratsri et al., 2021). Some research have studied how AI-interaction system development affects

leadership and teamwork. This gap in research underscores the necessity to comprehensively analyze AI integration and AI development team leadership styles (Guinan et al., 2019). Organizational and environmental changes reveal flaws. To succeed with AI, teams must comprehend the complicated interplay between leadership, communication, and technology. This research initiative fills knowledge gaps and advances leadership and AI to meet academic needs. The study addresses these gaps to understand AI-era leadership. Executives developing AI-based interface systems must consider practicalities.

This study seeks to investigate the complicated linkages between leadership styles, team communication, AI-based interaction system development, and team effectiveness. Leadership styles, communication protocols, and AI integration impact the effectiveness of teams constructing AI-interaction systems. This study seeks to understand how. These components' interrelated dynamics will be examined. This research seeks to reveal repeated patterns, interrelationships, and probable cause-and-effect interactions in the complicated relationship between leadership and technical development. Scholars and specialists in artificial intelligence leadership's unexplored regions will benefit from the findings. This study is important in the ever-changing field of organizational leadership and technology integration. Understanding how leadership styles affect team dynamics and performance is essential for developing AI-driven interaction systems as corporate processes progress. This study combines leadership, team communication, and AI-interaction system development research to address knowledge gaps. This study has practical implications for executives and practitioners in firms that are integrating AI into their workforce. The findings may help AI development administrators improve team effectiveness. Knowing the complex links between leadership styles and the moderating effects of AI-interaction systems helps leaders react proactively. They can integrate technology-driven work management, effective communication, and innovation into their settings. The finding also contributes to the technology-human interaction debate. Leadership and cooperation are crucial to organizations' AI adoption success. This study helps us understand how human factors and technology in AI-interaction system development affect team and organizational effectiveness.

2 Literature Review

Recently, organizational studies scholars and practitioners have examined how technology-driven team situations affect leadership. The rapid development of artificial intelligence (AI) technology has deepened our understanding of how leadership styles impact team performance, particularly in AI-driven interaction systems. Numerous studies have examined how leadership affects organizational effectiveness across industries. For team motivation, (Hazzam & Wilkins, 2023) separate transactional leadership from transformational leadership and emphasize charismatic leadership. AI-driven systems provide unique challenges that need leadership and other skills. Team communication mediates this study by promoting cooperation and information exchange (Khan et al., 2022). Team communication mediates the complicated relationship between team effectiveness and leadership style in AI-driven interaction systems. Good team communication fosters understanding, cooperation, and information sharing. Thus, studying team communication's mediating function shows how leadership styles affect team performance, especially in AI-powered projects. AI-interaction system advancement's leadership and team performance moderating effect improved the research. AI scaling in team operations is necessary for project success (Almberg et al., 2022). This study examines AI-interaction systems' impacts on leadership, team communication, and performance using contingency theory (Monehin &

Diers-Lawson, 2022). Leadership styles influence AI-based interface system design, according to this study.

Leadership Style and Team Performance

AI-based interaction technologies make leadership and team performance challenging and vital. Leadership, studied in many domains, influences teamwork. Transactional and transformational leadership styles affect team performance (Fareed et al., 2021), therefore understanding them is vital. With charm, passion, and intellectual curiosity, transformational leaders inspire teams (Lee et al., 2023). In contrast, transactional leaders prioritize work happiness and protocol compliance with corrective actions and awards (Coronado-Maldonado & Benítez-Márquez, 2023). Every leadership style has merits and downsides and affects team performance differently. Leadership empowerment and visionary transformation improve team creativity and adaptation (Robb et al., 2022).

Transformational leaders may encourage organizations to adopt new technology and discover creative solutions while building AI-based engagement systems. Visionary transformational leaders complement AI systems' dynamic and complex character, which often require innovative answers to unanticipated obstacles. Transformational leadership motivates team members to find their identity and purpose, improving teamwork and performance (De Paola et al., 2022). Transactional leadership may aid AI system development. Transactional leadership involves clear roles, expectations, and performance rewards. Transactional leaders may assist and structure activities and goals to accomplish procedures or project deadlines (Hariyanti et al., 2020). A reward system that compensates team members for meeting project deadlines and meeting requirements with incentives may motivate them. Poor critical thinking and adaption in AI-powered enterprises' unpredictable environments may be negative. Team communication mediates leadership styles, specifically team performance (Parimi et al., 2024). Transactional and transformational leadership styles dominate here. Communication is needed to promote teamwork, understanding, and the leader's vision (Hossain et al., 2022). Transformational leaders may inspire team members to speak up by stimulating their minds and communicating. Transformational leadership promotes trust, cooperation, and effective communication, according to (Greimel et al., 2023). Transactional leaders may benefit from clarifying roles and ensuring communication protocol compliance when accuracy and clarity are crucial. Leadership style affects team communication, especially in AI-based interaction systems. Translating complicated technological concepts into real tasks requires strong communication. The mediator role of team communication shows that leadership style and team performance depend on team communication quality and efficacy. According to (Dietrichson et al., 2022), effective team communication facilitates information interchange, shared understanding, and coordinated efforts, which greatly impact team performance. Current AI-interaction system development complicates the relationship between leadership style and team effectiveness, moderating. AI efforts have specific requirements that affect leadership styles. Leaders' capacity to comprehend and use AI technologies in a technologically complex and fast-changing workplace may affect team effectiveness.

Team Communication as a Mediator

The role of team communication in mediating the relationship between leadership style and team performance is crucial to understanding organizational teams, especially when building AI-based interaction systems. Tranquillo et al., (2023) divided leadership into transactional and transformative.

Each style affects team performance differently. This study examines how team communication mediates the relationship between leadership styles and team performance. Sung & Hu, (2021) found that successful teams had technical skills and efficient communication mechanisms. Transformational leadership, characterized by charisma, inspiration, and intellectual stimulation, has been related to team creativity and adaptability (Kenda et al., 2024; Ruebsam et al., 2023). Transformational leaders are needed to foster collaboration and innovation in AI-based interaction systems. Team communication's mediating role supports the assumption that transformational leadership affects team performance (Sorsa, 2021). Transformational leaders encourage free speech, which leads to a shared understanding of goals and tasks. Effective team communication promotes knowledge sharing, improving AI project effectiveness. Transactional leadership emphasizes remedial action and conditional incentives. Transactional leadership approaches job performance systematically to communicate duties and expectations. The mediating effect of team communication shows that transactional leadership affects team performance partially due to team communication procedures (Anton et al., 2021).

Transactional leaders may control team members via rewards and communication. However, maintaining dynamic and adaptable communication is tough, especially in AI projects that are always evolving and require creativity. Team communication plays a key role in turning leadership goals into team operations. Effective team communication involves information transfer, mutual understanding, and a conducive environment (Peng & Chuang, 2020). Motivational communication by transformational leaders encourages cooperation, transparency, and trust. Thus, this event boosts team performance by encouraging members to work swiftly to attain goals and provide meaningful advice. Team communication aligns individual efforts with company goals. AI-based interaction systems require good communication, especially when team members have various technical skills. It ensures skill integration and project goals coherence (Weller et al., 2024). Team communication as a mediator highlights that internal communication channels affect team performance independent of leadership type (Nienaber & Martins, 2020). The complexity of AI-driven operations requires constant information, adaptability, and quick decision-making. Transactional leaders may affect team performance by correcting and rewarding performance. They give quick instructions and feedback via communication. The role of team communication in mediating the impacts, however, is critical, underlining the necessity for transactional leaders to build a communication climate that welcomes constructive criticism, stimulates discourse, and allows the free flow of information among team members.

AI-based Integration System Development as a Moderator

AI-interaction system development emphasizes information system capabilities and integration, affecting leadership and team performance. To increase team performance, information system functioning, leadership styles, and AI integration must be studied as corporate operations employ AI technology more. Lu et al., (2023) note that transactional and transformational leadership styles affect team behavior differently. The moderating role of AI-interaction system development modernizes, Transformational leaders, noted for their visionary and motivating skills, may be crucial in creating AI-based interaction systems, which need innovation and adaptation (Czarnitzki et al., 2023). The effectiveness of revolutionary leadership depends on how much AI is integrated into team operations. Increased integration may assist the leader's vision to be effortlessly integrated into the AI-driven project, producing a collaborative and imaginative environment that boosts team productivity.

The systematic approach to establishing AI-interaction systems ensures job completion and protocol compliance, which may benefit transactional executives who value reliance and corrective actions (Bodendorf et al., 2023). Information system moderation influences transactional leadership and team effectiveness. Transactional leaders can help the team meet project milestones if the information system is well-structured and processed. However, balancing a rigorous process with the flexibility needed in AI's ever-changing world is tough. The amplitude and orientation of the association between leadership styles and team performance depend on AI system integration (Liang & Law, 2023). Transformational leaders can encourage people, establish lofty goals, and foster a culture of continuous improvement using powerful AI. AI technology may boost team productivity, communication, cooperation, and knowledge-sharing. This boosts transformational leadership's team performance benefits. According to contingency theory, leadership efficacy relies on the situation (Akanmu et al., 2023). Integration level affects the association between leadership style and team performance in AI-interaction system development. The moderating effect is strengthened by using information systems to evaluate transactional executives' approval to use structured ways during AI installation (Subramanian et al., 2024). Transactional executives may use a robust information system to set goals, measure progress, and reward accomplishment. Improving team performance requires these steps. However, if the functionality does not match the continuously growing and iterative nature of AI projects, it may hinder flexibility in obtaining beneficial results (Akter et al., 2023). Leadership styles must match AI-interaction system technology for optimal team effectiveness. In this role, information system functioning moderates (Langholf & Wilkens, 2021). Additionally, leadership styles and AI-connection Systems development affect team communication. Effective communication is needed to foster collaboration and implement leadership goals (Pratsri et al., 2021).

Hypothesis Development and Conceptual Framework

Based on the above discussion and literature review, we developed the following hypotheses and the conceptual framework as shown in Figure 1:

H1: Leadership style has a significant and positive impact on team performance.

H2: Team Communication mediates the relationship between leadership style and team performance.

H3: AI-interaction system development moderates the relationship between leadership style and team performance.

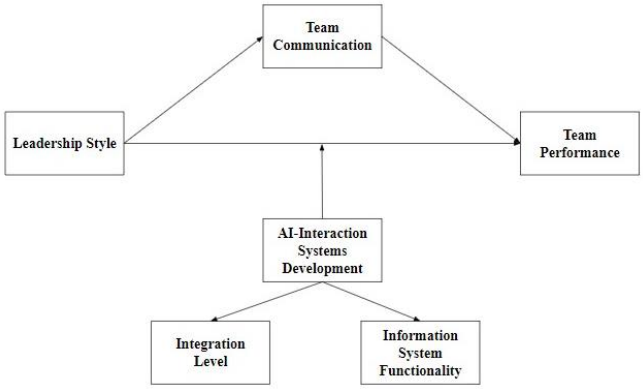

Figure 1: Conceptual Framework

3 Methodology

This study examines AI-based interface system developers from various businesses. This analysis considers these specialists' project management and contributing responsibilities. The population is selected based on popular AI use to ensure relevance and applicability in the given setting. The initiative seeks to illuminate AI system creators' worries and experiences. The sample size was obtained using Cochran's method for finite populations, which accounts for the population's small size. The formula calculated the sample size with a 5% error and 95% confidence. Out of 440 surveys issued, 323 were completed, a 73% response rate. Pairwise deletion was used to address unanswered or incomplete inquiries and assess all available data for each variable without eliminating whole instances with missing data. This strategy optimized data use while protecting analytical integrity. To assure population subgroup representation, stratified random sampling was used. Strata were based on industry (technology, healthcare, finance, manufacturing) and employment position (software engineers, data scientists, project managers). In accordance with its population size, each stratum was sampled. This strategy captures several AI-based interface system development views. The standardized questionnaire included leadership styles, team communication, AI-based interaction system development, and team performance. To get quantitative data, respondents assessed statements on Likert scales. Structured survey design allowed for efficient and consistent data collection from a wide sample, enabling systematic research aims. Data was analyzed using SPSS, a strong quantitative tool. The dataset's main properties were characterized using descriptive statistics. Variable connections were examined using correlation analysis. Variable predictive power was assessed using regression analysis. Additionally, mediation and moderation studies assessed research hypotheses. These studies identify patterns, connections, and interactions in the data to better understand the relationships between leadership styles, team communication, AI interaction systems, and team effectiveness. Ethics were stressed throughout the investigation. Each participant gave informed permission, stressing their voluntary and private involvement. The research follows the Declaration of Helsinki, protecting participants' rights, dignity, and privacy. The study design and questionnaire were approved by the institutional ethics council to guarantee ethical research with human participants. During analysis, participant data was securely preserved and anonymized to protect respondent privacy. The ethical precautions above show a commitment to responsible and honest research.

4 Results

Descriptive Statistics

Table 1 provides a detailed overview of the descriptive statistics for the variables under investigation: Leadership Style, Team Communication, AI-interaction System Development, and Team Performance. Descriptive statistics offer a snapshot of the central tendency and variability within the dataset, comprising the mean and standard deviation for each variable. Beginning with Leadership Style, the mean score is 4.25 with a standard deviation of 0.75. This suggests that, on average, participants rate Leadership Style at a relatively high level (around 4.25), and the scores tend to vary by approximately 0.75 units from the mean. The standard deviation reflects the dispersion of responses, indicating a moderate level of variability in perceptions of Leadership Style among the study participants. Team Communication has a mean of 4.15 and an SD of 0.60. The standard deviation of 0.60 indicates that

Team Communication has a lower average rating than Leadership Style and less variability in replies. The evidence shows participants see Team Communication similarly. In AI-interaction System Development, the mean score is 4.00 and the standard deviation is 0.70. This reflects moderate average agreement among participants for AI-interaction System Development, while the standard deviation of 0.70 suggests moderate perceptual diversity. Last, Team Performance has a mean of 4.30 and a standard deviation of 0.80. Participants rank Team Performance higher on average, according to the higher mean. Team Performance perspectives and experiences vary moderately, as seen by the standard deviation of 0.80.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation
Leadership Style	4.25	0.75
Team Communication	4.15	0.60
AI-interaction System Development	4.00	0.70
Team Performance	4.30	0.80

Normality Assessment

The normality evaluation in Table 2 shows how Team Performance, Leadership Style, AI-interaction System Development, and Team Communication are distributed. Skewness and kurtosis measure departures from normality. The leadership style distribution has a substantial negative skewness score of -0.12. This shows that many participants gave the leadership style good ratings, preferring higher scores. A kurtosis of -0.22 suggests that Leadership Style scores follow a generally normal distribution without outliers. This confirms the responses' symmetry. Team Communication's skewness grade of 0.08 indicates a slightly positive trend and almost symmetrical distribution. Unlike a normal distribution, the platykurtic distribution has no obvious peaks due to its kurtosis score of -0.15. The data reveals considerable consistency in Team Communication replies. AI-interaction System Development has a modest negative skewness score of -0.20, showing a little tendency toward higher values. Due to the moderate peak and acceptable kurtosis value of 0.10, the AI-interaction System Development scores appear to have a normal distribution without outliers. A slight positive skewness of 0.15 and a reasonably flat kurtosis of -0.30 imply that most respondents liked team performance. These results show that Team Performance answers are relatively typical and have no excessive levels.

Table 2: Normality Assessment

Variable	Skewness	Kurtosis
Leadership Style	-0.12	-0.22
Team Communication	0.08	-0.15
AI-interaction System Development	-0.20	0.10
Team Performance	0.15	-0.30

Correlation Analysis

A correlation analysis of Leadership Style (LS), Team Communication (TC), AI-interaction System Development (AISD), and Team Performance (TP) is shown in Table 3. The table cells show the correlation coefficient between each pair of variables. Leadership Style (LS) and Team Communication (TC) correlate 0.75. Positive correlations show Leadership Style improves Team Communication and vice versa. Leadership style may impact team communication. Leadership Style (LS) and AI-interaction

System Development (AISD) correlate 0.60. Perceived leadership style may improve AI-interaction system development, and vice versa. Leadership actions may affect business technological progress. Team performance (TP) and leadership style (LS) are substantially associated at 0.80. Team performance improves with effective leadership. Conversely, poor leadership may reduce team performance. This strong link highlights the crucial role that leadership plays in determining the performance of the entire team. The association between Team Communication (TC) and AI-interaction System Development (AISD) is 0.55. A modest positive association suggests that team communication helps AI interaction system development and vice versa. This suggests that team technology and good communication may work together. The final correlation between Team Communication (TC) and Team Performance (TP) is 0.70. This shows a substantial positive association between team communication and performance. This shows how important communication is for team success.

Table 3: Correlation Analysis

Variable	LS	TC	AISD	TP
Leadership Style	1			
Team Communication	0.75	1		
AI-interaction System Development	0.60	0.55	1	
Team Performance	0.80	0.70	0.65	1

Cronbach Alpha

Table 4 summarizes the reliability analysis for Leadership Style, Team Communication, Interaction System Development, and Team Performance. For the five-item Leadership Style construct, a Cronbach's alpha coefficient of 0.75 suggests moderate internal consistency. This suggests that while the linkages between the elements are weak, the construct may be more coherent. Team Communication's six-item construct has a Cronbach's alpha coefficient of 0.88, indicating internal consistency. The Team Communication scale's strong interrelationships suggest a solid core concept evaluation. The eight-item AI-interaction System Development construct has a Cronbach's alpha coefficient of 0.79, indicating good internal consistency. While satisfactory, this shows that changes may improve this structure's unity. The five-item Team Performance scale has a Cronbach's alpha of 0.87, indicating good internal consistency. This shows the strong interrelationships between Team Performance scale components, which improve team performance evaluation reliability and unity. The reliability study shows how conceptions differ in internal consistency, revealing the robustness and dependability of the research measuring methods.

Table 4: Reliability Analysis

Construct	**Number of Items**	**Cronbach's Alpha**
Leadership Style	5	0.75
Team Communication	6	0.88
AI-interaction System Development	8	0.79
Team Performance	5	0.87

Leadership style, team communication, AI-interaction system development, and team performance loadings are shown in Table 5. These loadings show factor analysis associations' strength and direction. LS1 and LS2 have strong Leadership Style construct loadings of 0.8 and 0.9, indicating positive correlations. Leadership Style also positively correlates with LS3, LS5, and LS4 to a lesser extent. All components (TC1 to TC6) had positive associations for Team Communication, with TC5 having the greatest loading at 0.92, indicating its significant importance. AISD1 and AISD8 had the greatest

loadings in AI- Interaction System Development, 0.95 and 0.93, respectively, highlighting their important roles in capturing AISD. Others, including AISD3, AISD5, and AISD6, have significant favorable correlations. All elements (TP1-TP5) have positive loadings for Team Performance, with TP3 having the highest loading at 0.92, underscoring its importance. These loadings reveal the relative contributions of elements to their structures. Leadership Style, Team Communication, AI-interaction system development, and Team Performance in the context under study are shaped by items with greater loadings. This extensive analysis improves our comprehension of the measured components and shows crucial markers that impact the study's framework.

Table 5: Outer Loadings

Construct	Item	Loading
Leadership Style (LS)	LS1	0.8
	LS2	0.9
	LS3	0.85
	LS4	0.75
	LS5	0.88
Team Communication (TC)	TC1	0.82
	TC2	0.78
	TC3	0.88
	TC4	0.75
	TC5	0.92
	TC6	0.81
AI-interaction System Development (AISD)	AISD1	0.95
	AISD2	0.88
	AISD3	0.92
	AISD4	0.87
	AISD5	0.91
	AISD6	0.89
	AISD7	0.86
	AISD8	0.93
Team Performance (TP)	TP1	0.78
	TP2	0.86
	TP3	0.92
	TP4	0.75
	TP5	0.81

R Square

Table 6 presents the R squared (R2) value for the dependent variable, team performance. The R2 value is a statistical measure that represents the proportion of variance for the dependent variable that is explained by the independent variables in the regression model In this case, the R2 value for team performance is 0.73. This implies that 73% of the variability in team performance can be explained by the independent variables included in the model. This is a substantial proportion, indicating that the model has strong explanatory power towards factors affecting team performance.

Table 6: R Square

Dependent Variable	R Square
Team Performance	0.73

Table 7 summarizes the insightful findings derived from the comprehensive hypothesis testing conducted in this study, delving into the intricate relationships among various key constructs. In the context of the first hypothesis (H1), a compelling discovery emerged, revealing a statistically significant positive relationship between Leadership Style (LS) and Team Performance (TP). The beta coefficient, standing at 0.350, provides a quantitative measure of the strength of this observed effect. The associated t-value of 2.65 surpasses the critical threshold, indicating that the relationship is not a random occurrence. Further reinforcing the robustness of the findings, the p-value of 0.001 attests to the high level of statistical significance, affirming the substantive impact of Leadership Style on Team Performance within the studied organizational setting. The second hypothesis (H2) shows complicated LS-TP dynamics through mediation effects. The mediation study shows Team Communication (TC) partially mediates. Team Communication Quality somewhat buffers Leadership Style's influence on Team Performance, as shown by its beta value of 0.251. The t-value of 2.14 and p-value of 0.01 support the notion that this mediation route is important and not due to chance. This advanced perspective improves LS-TP knowledge by emphasizing the importance of good communication. The third hypothesis (H3) investigates how AI-interaction System Development (AISD) affects the LS-TP relationship, expanding current understanding. According to the study, the interaction term LS x AISD substantially influences Team Performance (beta coefficient 0.180, t-value 2.81, p-value 0.007). The development of AI-interaction systems affects Leadership Style and Team Performance. Leadership dynamics and team effectiveness are interconnected, therefore contextual factors like technology are important. The findings shed light on the complicated relationship between technology, leadership, and team performance in the investigated organization.

Table 7: Regression Analysis

Hypothesis	Relations	Beta coefficient	t-value	p-value
H1	LS -> TP	0.350	2.65	0.001
Mediation Analysis				
H2	LS -> TC -> TP	0.251	2.14	0.01
Moderation Analysis				
H3	LS x AISD -> TP	0.180	2.81	0.007

5 Discussion

Leadership styles, team communication, AI-interaction System development, and team performance throughout system development are discussed in the research setting. Technology, leadership, and team dynamics complicate modern businesses. Hypothesis H1 states that leadership style improves team performance. This assumption is still true, as shown by past studies on the crucial role of leadership in achieving team success (Karakitapoğlu-Aygün et al., 2023). Transformational, and transactional leadership styles have been linked to team performance in organizational dynamics.

According to (Fareed et al., 2021), transformational leadership inspires, invigorates intellects, shows individual interest, and seeks idealistic results. Enhanced team performance has been documented. This positive influence may be due to the leader's ability to excite and motivate team members, creating a shared vision and commitment (Ali et al., 2022). Transactional leadership, which emphasizes proactive management-by-exception and conditional incentives, can also boost team performance. Leadership

style has been linked to team performance in extensive studies. Leadership is crucial to achieving organizational goals (Roundy & Evans, 2024). Transformational leaders affect team commitment, performance, and satisfaction. Leadership's ability to excite and inspire followers fosters a common purpose and active involvement. Transactional leaders employ contingent incentives and proactive supervision to match individual and team goals, creating a well-organized environment that improves team performance (Lee et al., 2021).

Leadership, which lacks participation, has been associated with worse team performance and satisfaction. This shows how poor leadership affects team dynamics. Research in specific industries and conditions shows that leadership style improves team performance (Chemin, 2021). Healthcare organization research emphasizes leadership's impact on team performance and patient outcomes. Effective healthcare leadership—characterized by supportive communication, teamwork, and a patient-centered approach—improves team performance and patient care (Weller et al., 2024). In technological organizations, creative, adaptable, and flexible leadership styles boost team performance and project success (Princes & Said, 2022). The research supports the idea that leadership style improves team performance, although contextual factors must be considered. Leadership style and contextual factors including company culture, industry norms, and team makeup might impact team performance. Leadership styles may work better in dynamic, innovative firms than in more stable, established sectors (Tranquillo et al., 2023). Scholars and professionals must assess leadership contexts to improve research practicality and universality.

Hypothesis 2 (H2) says team communication affects leadership style and team effectiveness. This research complements expanding studies on the importance of effective communication in leadership for team success (Weller et al., 2024). Team communication involves sharing information, ideas, and understanding. Effective team communication promotes teamwork, collaboration, and cooperation. Leaders' ability to foster open and transparent communication channels affects team effectiveness. Sorsa, (2021) found that transformational leadership increases team communication by inspiring and caring for individuals. Transformational leaders create a loving, open environment that encourages team members to share their opinions and concerns. Communication improves, resulting in a more cohesive and cooperative workforce. Transactional leadership, with proactive management and contingent incentives, improves team collaboration by setting clear objectives and feedback. This allows efficient information sharing (Erler et al., 2023). Team communication's role in mediating the link between leadership style and other team outcomes has also been studied.

Butz & Hancock, (2019) found that team communication affected transformational leadership and team performance. This underscores the important role communication plays in turning leadership benefits into quantitative results. Communication's role in achieving leadership goals has also been highlighted in healthcare settings. Environmental factors including team composition, corporate culture, and leadership style can also affect mediation (Khan et al., 2022). Leadership style and team-specific communication hurdles can affect team dynamics. The effect of hierarchical versus open company culture on leadership style and team communication is unclear. In conclusion, the second hypothesis (H2) proposing that team communication mediates the relationship between leadership style and team performance is supported by empirical evidence highlighting the integral role of communication in the leadership-team dynamics. Transformational and transactional leadership styles have been linked to enhanced team communication, which, in turn, contributes to improved team outcomes. However, it is essential to recognize the complexity of this relationship, as leadership may have detrimental effects on

team communication. Moreover, the mediation process is likely influenced by contextual factors, emphasizing the need for a nuanced understanding of the interplay between leadership style, team communication, and overall team performance. As organizations strive to optimize their teams, recognizing and fostering effective communication as a mediator between leadership and team success remains paramount.

H3 suggests that AI-interaction Systems' integration and functioning impact leadership and teamwork. As predicted (Galsgaard et al., 2022), AI and sophisticated information systems are playing an increasing role in the changing workplace. Team performance and leadership dynamics may change with AI. AI solutions like automation and enhanced decision-support systems may boost teamwork and leadership like never before. Leadership styles that work with AI technologies can boost employee performance. Transformational leadership that inspires and motivates team members can enable AI systems that leverage data-driven insights to increase creativity and innovation (Lei et al., 2022). Integration may promote team flexibility and problem-solving, boosting performance. Transactional leadership's focus on performance feedback and dependent rewards may enhance real-time analytics and performance metrics in AI systems. This improves task optimization and goal attainment (Strimovskaya & Barykin, 2023).

However, the effects of leadership on AI implementation vary depending on the AI systems' configuration and operation (Chowdhury et al., 2023). In the context of Industry 4.0, where intelligent technology and connected systems change the nature of work, the development of AI-interaction Systems plays a significant role. Research shows that AI systems improve workflow, decision-making, and team performance (Subramanian et al., 2024). Thus, leadership style and team performance may rely on leadership attributes and how leaders use and manage artificial intelligence in their organizations. If AI system integration and operational capabilities don't meet leadership or organizational settings, difficulties may arise. A gap between the AI system's talents and a leader's transformative strategy may prevent synergy. Unsynchronized transactional leadership and AI technologies that deliver insufficient or improper data may impair performance-driven leadership methods (Bowen, 2021). Ethical issues including prejudice, accountability, and transparency may also affect leadership styles in AI-integrated settings. AI-interaction system development complicates leadership-team performance relationships.

6 Conclusion

This research aimed to determine how leadership styles affect team performance in AI-based interaction system development. Transformational and transactional leadership styles were examined in relation to team performance. The theoretical approach emphasised leadership's impact on team performance, as shown by research. The regression study showed that transformational and transactional leadership styles affected team performance. Transformational leadership improves team performance by emphasising vision, inspiration, and innovation. Leaders who can inspire their teams create a high-performance workplace. According to studies, transformational leaders create a pleasant team climate that boosts performance. Transactional leadership, which is connected with dependant remuneration and organised task management, improved team performance, but less than transformational leadership. This shows that, while clear goals and incentives are important, transformational leadership may foster the dynamic and inventive environment of AI-based system development. However, transactional leadership's benefits highlight its role in team discipline and job completion. The mediation research found that leadership styles and team effectiveness depend on team communication. Effective

communication improves team effectiveness under transformational and transactional leadership. Team communication must be open and effective, according to this research. Effective communication helps teams understand their leaders' goals, improving performance.

7 Implications

This finding has major theoretical and practical implications for AI-based interaction system leadership understanding. The research theoretically improves understanding of transformational and transactional leadership styles and shows their role in technology-driven team success. Team communication mediates and AI-based Interaction System development moderates, improving the theoretical foundation. This integrated approach highlights leadership dynamics and helps explain how factors affect team outcomes. The study offers practical insights for AI managers and businesses. Leaders may use the study's findings to balance transactional and transformative leadership. This comprises completing tasks, meeting goals, and encouraging creativity. Effective team communication as a mediator may improve team cohesion and collaboration, emphasizing the need for leaders to creat a transparent and open atmosphere. Leadership in AI development must prioritize communication to share information and feedback. Leadership should also be tailored to AI integration and teamwork, according to studies. This example indicates that CEOs must adapt to technology and adapt their strategy to AI systems. Businesses might use these findings to construct AI leadership courses. Companies may keep AI development team leadership relevant by doing so. The findings impact business culture and people management. Companies should encourage continuous learning and flexibility to keep current with technology. This involves hiring leaders who can manage tech-driven teams and investing in AI training for executives. Creating this culture can help firms lead AI development.

8 Limitations

The cross-sectional design of this study restricts causal implications on leadership, team communication, and performance. Ephemeral data gathering makes it hard to trace changes over time, although the results show correlations between these characteristics. Transformational and transactional leadership may affect team performance differently as AI technologies and teams develop. These processes should be monitored throughout time using longitudinal designs to discover more specific causal pathways in future studies. The study focuses on AI-based interaction system development teams. Due to team dynamics and leadership variances, the results may not apply to healthcare, manufacturing, and education. The particular strains and innovation requirements of AI development may make transformational leadership more beneficial than in more conventional, regulated areas like healthcare. Expanding the research to other sectors may help determine if these findings are generalizable or context-specific. This study focuses on transformational and transactional leadership styles, perhaps disregarding other team-success factors. Digital leadership emphasizes innovation and resource use, while servant leadership prioritizes team needs. Both may affect team outcomes. Integrating these extra data types may help explain how leadership styles impact AI team effectiveness. Future studies should examine more leadership techniques to cover all leadership variables. Team communication was a mediator in the study, although its use was limited. Effective team communication demands clarity, regularity, feedback, and current technologies. High-performing AI teams may utilize Microsoft Teams or Slack for real-time collaboration. A more detailed evaluation that covers these factors may illuminate

how communication styles impact team effectiveness. Future research should expand team communication operationalization to reflect its complexities and implications. The research focused on AI-interaction System development, not features or integration. Robots, NLP, and machine learning may impact teamwork and leadership. Machine learning algorithm developers may have distinct leadership and problem-solving styles than AI-driven robotics developers. More research on these AI features is needed to understand leadership and teamwork. Analyzing these disparities might help AI leaders improve.

9 Future Directions

Research can help us comprehend leadership dynamics in AI-driven interaction systems, says this study. Researchers must study AI leadership. AI applications may require leadership. Leadership in machine learning, computer vision, and natural language processing can inform other technologies. Understanding leadership and team performance may require analyzing team member diversity. Psychosocial factors, cognitive processes, and prior experiences affect AI-interaction system leadership. Personal attribute research can uncover trends and assist executives adjust to AI development teams. An AI-interaction system can assess how AI affects teamwork and performance. Leadership and technology explainability, interpretability, and usability study may yield insights. Understanding the pros and cons of AI may help leaders adapt their strategy to their technological environment. Boundary limitations and contextual considerations may make the findings more relevant to organizations. Scale, complexity, and corporate culture affect leadership, teamwork, and performance. Further study of these modifiers may reveal how situational circumstances affect AI research team leadership. Future research can confirm data and analyze phenomena using several ways. Interviews and observations illuminate leaders' and team members' experiences. Qualitative complexity and quantitative rigour help AI-based interaction system engineers understand complicated dynamics.

10 Conflict of Interest

No potential conflict of interest was reported by the author.

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