Engineering Leadership Reimagined: Evaluating The Influence of Human-Centered Leadership on Project Team Dynamics

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Abstract- This research explores how human-centered leadership—an evolved model combining emotional intelligence, empowerment, and adaptive communication—affects the cohesion and performance of engineering project teams. With the increasing complexity of infrastructure and development projects, technical managers are now expected to lead with empathy, clarity, and responsiveness in addition to their technical skills. A survey was conducted among 15 engineers and technical staff across various firms to evaluate their project leaders based on eight modified leadership traits rooted in human-centered leadership: clarity of purpose, emotional intelligence, adaptability, accountability, innovation encouragement, trust-building, team inclusiveness, and results orientation. Findings suggest that clarity of purpose and trust-building were the most influential in driving team morale and productivity. This study recommends leadership development programs that integrate emotional and social competencies tailored for the engineering context.

I. INTRODUCTION

1.1 Background of the Study

Engineering leadership is no longer just about overseeing tasks—it now involves managing people with diverse expectations and workstyles. The shift toward people- centric project management has given rise to leadership models that emphasize emotional intelligence, adaptability, and purpose-driven engagement. Human-centered leadership is an emerging approach that aligns with these expectations, encouraging engineering managers to lead not only through expertise but through connection, support, and empowerment.

1.2 Statement of the Problem

While many engineering managers possess technical skills, few are trained in interpersonal and adaptive leadership. This results in misalignment, poor communication, and disengaged teams. This study seeks to examine the extent to which human-centered leadership traits impact project team performance and cohesion.

1.3 Objectives of the Study

- To assess the prevalence of human-centered leadership traits among engineering project managers.
- To identify which traits contribute most to positive team outcomes.
- To recommend strategies for developing people-oriented leadership in technical environments.

1.4 Significance of the Study

This research will help bridge the gap between technical management and people leadership in engineering. It offers insights for organizations and academic institutions seeking to develop balanced leaders capable of technical execution and human engagement.

1.5 Scope and Delimitations

The study includes engineering project teams from Metro Manila and nearby provinces. It focuses on employees with direct experience working under a project leader for at least six months. The results are limited to perceptions and do not include actual performance metrics.

1.6 Ethical Considerations

Participation in the study was voluntary. Respondents were informed of the purpose of the research, and all data were kept confidential and used solely for academic purposes.

II. REVIEW OF RELATED LITERATURE

2.1 Evolution of Leadership in Technical Fields
Historically, leadership in engineering was associated with hierarchical command and control. However, recent literature (Goleman, 1995; Hölzle, 2010) emphasizes emotional and social competencies as key drivers of team performance.

2.2 Human-Centered Leadership Framework
Human-centered leadership integrates emotional intelligence, empathy, clarity, trust, and empowerment. It aligns closely with modern expectations in diverse and high- pressure team settings.

2.3 Related Studies
Studies such as McDonough (2000) and Notgrass (2013) suggest that leaders who foster inclusion, trust, and open communication create more resilient and effective teams, particularly in project-based environments.

III. RESEARCH METHODOLOGY

3.1 Research Design
This study used a descriptive quantitative research approach. A structured survey questionnaire was used to evaluate the leadership traits of project leaders as perceived by their team members.

3.2 Participants and Sampling

Fifteen participants from engineering firms based in Metro Manila and nearby provinces were selected using purposive sampling. All respondents had been working under their respective project leaders for at least six months.

3.3 Demographic Profile of Respondents

- Gender: 60% Male, 40% Female

- Age Range: 25 - 55 years old

- Roles: Civil Engineers (40%), Electrical Engineers (20%), Architects (20%), Other Technical Staff (20%)
- Years in Service: 6 Months and above

3.4 Instrumentation

The survey included 32 items (4 per trait) evaluating eight human-centered leadership traits:
1. Clarity of Purpose
2. Emotional Intelligence
3. Adaptability
4. Accountability
5. Innovation Encouragement
6. Trust-Building
7. Team Inclusiveness
8. Results Orientation

Each statement was rated on a 7-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree).

3.5 Data Analysis

Data were analyzed by computing the mean score for each leadership trait. The scores were also correlated with a 4-item measure of perceived team performance to determine which traits had the strongest influence.

IV. RESULTS AND DISCUSSION

4.1 Trait Analysis Summary Chart

Summary of Mean Scores per Leadership Trait

Trait	Mean Score
Trust-Building	6.52
Clarity of Purpose	6.47
Team Inclusiveness	6.20
Emotional Intelligence	6.13
Accountability	5.90
Results Orientation	5.80
Adaptability	5.70
Innovation Encouragement	5.60
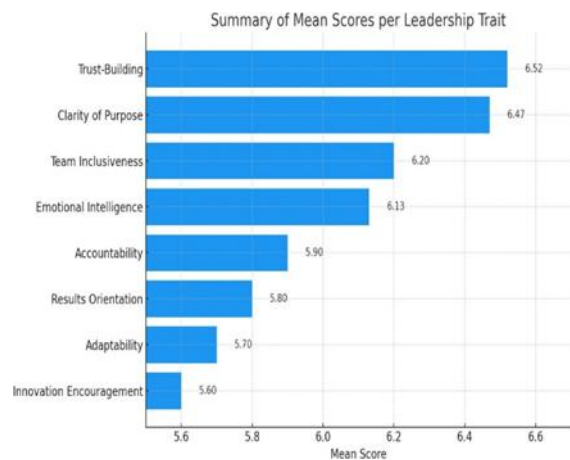
4.2 Discussion of Findings

The results show that trust-building and clarity of purpose are the most observed and impactful traits among human-centered leaders in engineering. These were closely followed by team inclusiveness and emotional intelligence. Innovation encouragement and adaptability had lower mean scores, indicating that while important, these are less frequently exhibited. Respondents also reported higher motivation and clearer communication when their leaders demonstrated trust and purpose. This aligns with the theory that emotionally intelligent leadership strengthens team engagement.

IV. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

This study examined the presence and impact of human-centered leadership traits in engineering project teams. Using a descriptive quantitative method, 15 technical staff members evaluated their project leaders. Trust-building and clarity of purpose emerged as the top leadership traits influencing positive team outcomes.

5.2 Conclusion

Human-centered leadership is effective in fostering high-performance project teams. Engineering managers who lead with empathy, clarity, and inclusivity create stronger, more cohesive teams.

5.3 Recommendations

- Organizations should invest in leadership development that includes soft skills training.
- Engineering curricula should include modules on emotional intelligence and adaptive leadership.
- Future studies should include larger and more diverse samples and explore how these traits impact project KPIs.

APPENDIX

Appendix A: Sample Survey Items (see Appendix B for full list) Sample computation of trait using responses from 15 participants on 4-survey items.:

Trait: Clarity of Purpose

Item	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Q1: Communicates clearly	6	7	7	6	7	6	7	6	7	6	6	7	6	7	7
Q2: Tasks understanding	7	6	7	6	6	7	6	7	6	6	7	6	6	6	7
Q3: Clear directions under pressure	6	7	6	6	6	6	7	6	6	7	6	7	6	6	6
Q4: Reviews objectives	7	6	7	6	6	6	6	7	6	7	6	7	6	6	7

Mean Score per Participant:

- P1: (6+7+6+7)/4 = 6.50
- P2: (7+6+7+6)/4 = 6.50
- P3: (7+7+6+7)/4 = 6.75
- P4: (6+6+6+6)/4 = 6.00
- P5: (7+6+6+6)/4 = 6.25
- P6: (6+7+6+6)/4 = 6.25
- P7: (7+6+7+6)/4 = 6.50
- P8: (6+7+6+7)/4 = 6.50
- P9: (7+6+6+6)/4 = 6.25
- P10: (6+6+7+7)/4 = 6.50
- P11: (6+7+6+6)/4 = 6.25
- P12: (7+6+7+7)/4 = 6.75
- P13: (6+6+6+6)/4 = 6.00
- P14: (7+6+6+6)/4 = 6.25
- P15: (7+7+6+7)/4 = 6.75

Overall Mean Score for "Clarity of Purpose":

(6.50 + 6.50 + 6.75 + 6.00 + 6.25 + 6.25 + 6.50 + 6.50 + 6.25 + 6.50 + 6.25 + 6.75 + 6.00 + 6.25 + 6.75) / 15 = 6.47

Trait: Trust Building

Item	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Q1: Open communication	7	6	6	6	7	7	6	7	6	6	6	6	7	7	6
Q2: Respects confidentiality	6	6	7	7	7	6	6	6	7	7	6	6	6	6	7
Q3: Gives credit	7	6	7	6	6	6	7	7	6	6	6	7	6	6	6
Q4: Committed	6	6	6	7	7	6	6	6	6	6	6	6	6	6	6

Mean Score per Participant

- P1: (7+6+7+6)/4 = 6.50
- P2: (6+6+6+6)/4 = 6.00
- P3: (6+7+7+6)/4 = 6.50
- P4: (6+7+6+7)/4 = 6.50
- P5: (7+7+6+7)/4 = 6.75
- P6: (7+6+6+6)/4 = 6.25
- P7: (6+6+7+6)/4 = 6.25
- P8: (7+6+7+6)/4 = 6.50
- P9: (6+7+6+6)/4 = 6.25
- P10: (6+7+6+6)/4 = 6.25
- P11: (6+6+6+6)/4 = 6.00
- P12: (6+6+7+6)/4 = 6.25
- P13: (7+6+6+6)/4 = 6.25
- P14: (7+6+6+6)/4 = 6.25
- P15: (6+7+6+6)/4 = 6.25

Appendix B: Full Survey Instrument – Human-Centered Leadership Traits (32 Items)

Instruction: Please rate each statement based on your experience with your immediate project leader using the scale below:

1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Neutral, 5 = Slightly Agree, 6 = Agree, 7 = Strongly Agree

Clarity of Purpose

1. My leader clearly communicates the team's goals and expectations.
2. I understand how my daily tasks contribute to the bigger picture.
3. My leader gives clear directions even under pressure.
4. Objectives are regularly reviewed and aligned with project outcomes.

Emotional Intelligence

5. My leader stays calm and composed during stressful situations.
6. They are aware of their own emotions and manage them effectively.
7. They recognize the emotional needs of team members.
8. My leader shows empathy when someone is struggling.

Adaptability

9. My leader adjusts strategies when project conditions change.
10. They are open to new ideas from the team.
11. They respond positively to unexpected project challenges.
12. They model flexibility when priorities shift.

Accountability

13. My leader owns up to mistakes instead of shifting blame.
14. They hold team members responsible for results.
15. They lead by example in terms of discipline and reliability.
16. Feedback is used constructively to improve performance.

Innovation Encouragement

17. My leader supports experimenting with new ideas.
18. They reward initiative and creative thinking.
19. I am encouraged to challenge the status quo when needed.
20. My ideas are taken seriously even if they differ from the norm.

Trust-Building

21. My leader fosters a safe space for open communication.
22. Confidential matters are handled with discretion and respect.
23. I trust my leader to act in the team's best interest.
24. They consistently follow through on their commitments.

Team Inclusiveness

25. My leader ensures everyone feels heard and valued.
26. They treat all team members fairly and respectfully.
27. Decisions are often made with input from the group.
28. Differences in background and experience are respected.

Results Orientation

29. My leader sets clear performance expectations.
30. They monitor progress and follow up regularly.
31. They push the team to meet deadlines without sacrificing quality.
32. They focus on achieving project goals while

supporting the team.

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