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# Examining the Impact of Transformational Leadership on Innovation Management in Engineering Firms: A Refined Test of the Mediating Role of Team Engagement

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## Abstract:

This study examines whether transformational leadership influences innovation management directly and whether team engagement carries part of that influence in engineering and related firms. Using a quantitative cross-sectional design, the study analyzed 350 valid survey responses after the removal of one incomplete case. Transformational leadership was measured with the Global Transformational Leadership Scale, team engagement with the UWES-9, and innovation management with innovation-related items adapted from prior research. A post hoc item-level diagnostic review showed that one reverse-worded innovation item (IM5) performed weakly and reduced the internal consistency of the innovation construct. After removing IM5, Cronbach's alpha for innovation management improved from .683 to .760, while the substantive pattern of results remained stable. Transformational leadership positively predicted innovation management ($\beta = .504$, $p < .001$) and team engagement ($\beta = .408$, $p < .001$). Team engagement also positively predicted innovation management ($\beta = .472$, $p < .001$). Mediation analysis further indicated a significant partial indirect effect ($\beta = .130$, 95% CI [.076, .191]). The findings suggest that innovation management

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in engineering firms depends not only on leadership directly but also on the energy, commitment, and involvement that teams bring to their work.

**Keywords:** Transformational leadership; team engagement; innovation management; engineering firms; mediation; scale refinement

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# دراسة تأثير القيادة التحويلية على إدارة الابتكار في الشركات الهندسية: اختبار مُحسَّن للدور الوسيط لانخراط الفريق

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**ملخص:**

تدرس هذه الدراسة ما إذا كانت القيادة التحويلية تؤثر بشكل مباشر على إدارة الابتكار، وما إذا كان لانخراط الفريق دور في هذا التأثير في شركات الهندسة والشركات ذات الصلة. باستخدام تصميم كمي مقطعي، حللت الدراسة 350 استجابة صالحة للاستبيان بعد استبعاد حالة واحدة غير مكتملة. قُيست القيادة التحويلية باستخدام مقياس القيادة التحويلية العالمي، وانخراط الفريق باستخدام مقياس**UWES–9**، وإدارة الابتكار باستخدام بنود متعلقة بالابتكار مُقتبسة من أبحاث سابقة. أظهرت مراجعة تشخيصية لاحقة على مستوى البنود أن أحد بنود الابتكار (**IM5**) المصاغة بشكل عكسي كان ضعيف الأداء، مما قلل من الاتساق الداخلي لمفهوم الابتكار. بعد استبعاد**IM5** ، تحسن معامل ألفا لكرونباخ لإدارة الابتكار من 0.683 إلى 0.760، بينما ظل النمط الموضوعي للنتائج ثابتًا. تنبأت القيادة التحويلية بشكل إيجابي بإدارة الابتكار(**β = 0.504**, **p < 0.001**) ، وانخراط الفريق(**β = 0.408**, **p < 0.001**) ، كما تنبأت مشاركة الفريق بشكل إيجابي بإدارة الابتكار(**β = 0.472**, **p < 0.001**) ، وأشار تحليل الوساطة أيضًا إلى وجود تأثير غير مباشر جزئي ذي دلالة إحصائية(**β = 0.130**) ، فاصل الثقة 95 **%**

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**0.076]**، 0.191 .([تشير النتائج إلى أن إدارة الابتكار في شركات الهندسة لا تعتمد على القيادة بشكل مباشر فحسب، بل تعتمد أيضًا على الطاقة والالتزام والمشاركة التي تُضفيها الفرق على عملها.

**الكلمات المفتاحية**: القيادة التحويلية؛ إشراك الفريق؛ إدارة الابتكار؛ شركات الهندسة؛ الوساطة؛ تحسين النطاق

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## The research

### 1. Introduction

Innovation has become a strategic necessity in engineering firms, where organizations must respond continuously to technological change, project complexity, and rising competitive pressure. In these settings, innovation management extends beyond new products or services and also includes improving methods, systems, workflows, and organizational practices. Because such outcomes depend heavily on people, coordination, and problem solving, leadership becomes a central condition for building an environment in which innovation can be sustained. Transformational leadership is particularly relevant in this regard because it is associated with vision, trust, recognition, developmental support, and intellectual stimulation (Bass, 1985; Carless et al., 2000). These qualities are highly valuable in engineering contexts, where employees often work in technically demanding and interdependent settings.

Yet leadership may not shape innovation only through direct managerial influence. Part of its effect may unfold through employees' work-related psychological states. Team engagement, reflected in vigor, dedication, and absorption, is one of the most plausible mechanisms in this process (Kahn, 1990; Schaufeli et al., 2002, 2006). Engaged teams are typically more persistent, more attentive, and more willing to invest effort in problem solving and improvement. Although prior studies have linked transformational leadership to both engagement and innovation-related outcomes, fewer studies have examined these variables together in engineering and related firms, and even fewer have tested engagement as a mediating mechanism in that context (Breevaart et al., 2014; Denti & Hemlin, 2012; Kwon & Kim, 2020).

The present article addresses that gap. It contributes in three ways. First, it tests an integrated model linking transformational leadership, team

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engagement, and innovation management in engineering and related firms. Second, it offers evidence from a professional sample of employees working in technically oriented organizations. Third, it strengthens the measurement side of the model by reporting the consequences of removing an underperforming innovation item and comparing the results before and after item refinement. Figure 1 presents the conceptual model tested in the article and Table 1 summarizes the role of each core construct. This final contribution is important because journal articles are evaluated not only by the significance of their findings but also by the quality of their measurement decisions.

## 2. Literature Review and Hypotheses Development

Transformational leadership was initially conceptualized by Burns (1978) and later operationalized by Bass (1985) as a leadership style that elevates follower motivation, aligns effort with collective goals, and encourages performance beyond routine expectations. In organizational settings, transformational leaders communicate a compelling vision, support employee development, foster trust, recognize contributions, and stimulate new ways of thinking (Carless et al., 2000). These behaviors are especially relevant in engineering firms, where work is technical, project-based, and often dependent on sustained collaboration.

Innovation management refers to the organizational capability to support, implement, and sustain useful new ideas, methods, and practices. It is closely related to innovativeness and learning orientation and reflects whether an organization actively seeks new ways of doing things and turns them into workable practices (Calantone et al., 2002). Team engagement, by contrast, refers to a positive work-related state characterized by vigor, dedication, and absorption (Schaufeli et al., 2002, 2006). In engineering settings, engaged teams are more likely to remain committed under pressure, contribute to problem solving, and persist in improvement-oriented tasks.

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Prior research indicates that transformational leadership is positively associated with innovation-related outcomes and employee engagement (Breevaart et al., 2014; García-Morales et al., 2012; Wang et al., 2011). Research also suggests that engagement is relevant for innovative behavior and may help explain how workplace conditions translate into improvement-oriented outcomes (Kwon & Kim, 2020). It is therefore reasonable to expect a direct effect of transformational leadership on innovation management and an indirect effect through engagement. As Figure 1 illustrates, the proposed model links transformational leadership to innovation management both directly and indirectly through team engagement. Based on that reasoning, the study tests four hypotheses: H1, transformational leadership positively affects innovation management; H2, transformational leadership positively affects team engagement; H3, team engagement positively affects innovation management; and H4, team engagement mediates the relationship between transformational leadership and innovation management.

**Figure 1. Conceptual Model**

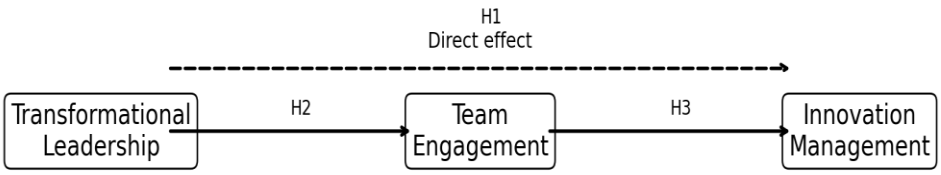

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**Table 1. Core Constructs Used in the Study**

| Construct | Role in the Model | Core Meaning |
|---|---|---|
| Transformational Leadership | Independent variable | Leadership behaviors related to vision, support, trust, recognition, and intellectual stimulation. |
| Team Engagement | Mediating variable | Employees' energy, dedication, and work involvement reflected in vigor, dedication, and absorption. |
| Innovation Management | Dependent variable | Organizational capability to support, implement, and sustain useful new ideas and improvement. |

## 3. Method

The study employed a quantitative cross-sectional survey design, which is appropriate for testing relationships among variables at a specific point in time (Creswell & Creswell, 2018). The target population consisted of employees and professionals working in engineering firms and in organizations closely related to engineering activity. Data were collected through an online questionnaire distributed via company contacts and LinkedIn. After item-level screening, one case was removed because of a missing value in the team engagement scale, leaving 350 valid responses for analysis.

Transformational leadership was measured using the seven-item Global Transformational Leadership Scale (Carless et al., 2000). Team engagement was measured using the nine-item Utrecht Work Engagement Scale (UWES-9), which is widely used to assess vigor, dedication, and absorption (Schaufeli

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et al., 2006). Innovation management was initially measured with six innovation-related items adapted from prior research on innovativeness and organizational learning (Calantone et al., 2002). Table 2 summarizes the measurement instruments, number of items, and response formats used for each construct. All analyses were conducted at the construct level using scale means.

**Table 2. Measurement Instruments**

| Variable | Scale / Source | Items | Response format |
|---|---|---|---|
| Transformational Leadership | Global Transformational Leadership Scale (Carless et al., 2000) | 7 | 5-point Likert scale |
| Team Engagement | UWES-9 (Schaufeli et al., 2006) | 9 | 7-point frequency scale |
| Innovation Management | Innovation-related items adapted from Calantone et al. (2002) | Initially 6; retained 5 | Likert-type agreement scale |

Before hypothesis testing, the measurement structure of the innovation management construct was reviewed in greater detail. The initial six-item version showed weaker internal consistency than the other constructs, and IM5 displayed a very weak item-total association ($r = .053$). Because IM5 was reverse-worded and conceptually closer to resistance to innovation than to active innovation support, it appeared to be weakening the coherence of the construct. As reported in Table 3, removing IM5 improved Cronbach's

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alpha from .683 to .760. As a result, a refined five-item version of innovation management was retained for the main article analyses. This decision improved the internal consistency of the scale and yielded a more conceptually coherent operationalization, consistent with the logic of reliability-based item diagnostics (Field, 2018). To maintain transparency, the paper reports the before-and-after diagnostics for the construct.

**Table 3. Innovation Management Diagnostics Before and After Item Refinement**

| Version of the Construct | Included Items | Cronbach's alpha | Diagnostic Note |
|---|---|---|---|
| Initial version | IM1–IM6 | .683 | Borderline internal consistency; IM5 underperformed. |
| Refined version | IM1, IM2, IM3, IM4, IM6 | .760 | Improved internal consistency after removing IM5. |

The statistical analysis proceeded in four stages. First, descriptive statistics were calculated for the three main constructs. Second, internal consistency was assessed using Cronbach's alpha. Third, direct effects were tested using regression-based models with standardized coefficients. Fourth, mediation was examined by testing the indirect effect of transformational leadership on innovation management through team engagement and calculating a bootstrap confidence interval, following regression-based mediation logic (Hayes, 2022).

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## 4. Results

The descriptive results indicated that transformational leadership (M = 4.03, SD = 0.72) and team engagement (M = 3.97, SD = 0.66) were both perceived at relatively positive levels. Innovation management, after removing IM5, showed a moderate-to-positive level (M = 3.68, SD = 0.80). Table 4 presents the descriptive statistics for the retained model, and Figure 2 visually summarizes the final structural relationships. These findings suggest that the participating organizations reported relatively strong human and leadership conditions, while innovation practices remained somewhat more cautious and uneven.

**Table 4. Descriptive Statistics for the Main Constructs (Retained Model, n = 350)**

| Construct | Mean | SD |
|---|---|---|
| Transformational Leadership | 4.03 | 0.72 |
| Team Engagement | 3.97 | 0.66 |
| Innovation Management (5 items) | 3.68 | 0.80 |

The measurement diagnostics confirmed that item refinement improved the innovation construct. In the six-item version, innovation management showed Cronbach's alpha of .683, indicating only borderline internal consistency. IM5 had a notably weak item-total correlation (r = .053), suggesting that it did not move in line with the rest of the construct. Table 3 makes this improvement explicit by comparing the initial and refined versions of the innovation management measure. After removing IM5, Cronbach's alpha improved to .760. This change did not alter the substantive logic of the model, but it produced a more stable and defensible measure for journal presentation.

The structural results supported all four hypotheses. Transformational leadership had a positive and significant effect on innovation management (β

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= .504, $p < .001$), supporting H1. It also had a positive and significant effect on team engagement ($\beta = .408$, $p < .001$), supporting H2. Team engagement positively predicted innovation management ($\beta = .472$, $p < .001$), supporting H3. The detailed hypothesis tests are reported in Table 5, while Figure 2 shows the retained structural model. In the full model, both transformational leadership ($\beta = .373$, $p < .001$) and team engagement ($\beta = .319$, $p < .001$) remained significant. The indirect effect of transformational leadership on innovation management through team engagement was .130, and the bootstrap 95% confidence interval [.076, .191] excluded zero, supporting H4 and indicating partial mediation.

**Table 5. Hypothesis Testing and Mediation Results (Retained Model)**

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| Hypothesis / Effect | Standardized estimate | p-value | Interpretation |
|---|---|---|---|
| H1: Transformational Leadership → Innovation Management | .504 | < .001 | Supported |
| H2: Transformational Leadership → Team Engagement | .408 | < .001 | Supported |
| H3: Team Engagement → Innovation Management | .472 | < .001 | Supported |
| Indirect effect: TL → TE → IM | .130 | 95% CI [.076, .191] | Significant; partial mediation |
| Direct effect in full model: TL → IM | .373 | < .001 | Remains significant |
| Team Engagement → Innovation Management (full model) | .319 | < .001 | Remains significant |

A comparison between the pre-refinement and post-refinement models is especially informative. Removing IM5 improved measurement quality while preserving the overall structure of the results. Table 6 compares the key indicators before and after the refinement step and shows that the direction and significance of the main relationships remained stable. The model therefore remained theoretically intact: transformational leadership predicted innovation management both directly and indirectly through team engagement. This stability increases confidence that the reported relationships are not artifacts of one problematic item.

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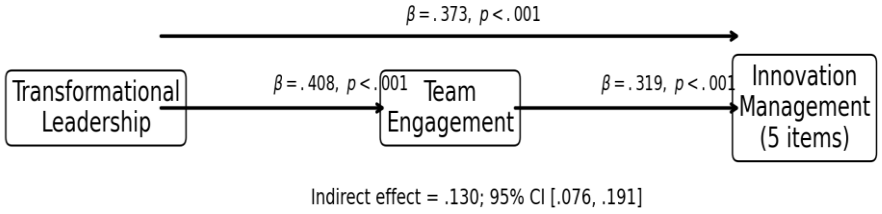
**Table 6. Comparison of Key Results Before and After Removing IM5**

| Indicator | Earlier 6-item version | Refined 5-item version | Interpretation |
|---|---|---|---|
| Innovation management reliability | Lower consistency (α = .683) | Improved consistency (α = .760) | Measurement quality improved |
| Role of TL | Positive and significant | Positive and significant | Substantive conclusion unchanged |
| Role of TE | Positive and significant | Positive and significant | Substantive conclusion unchanged |
| Mediation pattern | Partial mediation | Partial mediation | Theoretical model remained stable |

**Figure 2. Final Structural Model Based on the Refined Innovation Measure**




## 5. Discussion

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The results reinforce the argument that innovation management in engineering firms is not only a technical or procedural matter. It is also shaped by leadership and by the engaged condition of teams. The positive direct effect of transformational leadership on innovation management is consistent with prior work suggesting that leaders influence innovation through vision, support, trust, and the encouragement of new ways of thinking (Denti & Hemlin, 2012; García-Morales et al., 2012). In engineering environments, where improvement often depends on disciplined collaboration rather than spontaneous creativity alone, these leadership behaviors appear to be especially consequential.

The positive relationship between transformational leadership and team engagement also supports the idea that leadership works partly by shaping employees' experience of work. When leaders provide meaning, recognition, and developmental support, employees appear more willing to invest energy and attention in their tasks (Breevaart et al., 2014; Schaufeli et al., 2006). This is important in technical settings, where engagement may function as a practical resource rather than merely a positive attitude.

The mediation result gives the study additional explanatory value. It suggests that leaders do not influence innovation only through direct instruction or formal organizational structure. They also affect whether employees are energized, committed, and psychologically involved enough to support improvement in everyday work (Kahn, 1990; Kwon & Kim, 2020). This pattern is visible in Figure 2, where the direct path from transformational leadership to innovation management remains significant alongside the indirect path through team engagement. This makes team engagement a meaningful mechanism in the leadership–innovation relationship.

The item-refinement analysis further strengthens the article. From a scientific editing perspective, keeping an underperforming item merely to preserve the original instrument can weaken the overall manuscript. In this case, removing IM5 did not reverse any substantive conclusion. Instead, it improved internal

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consistency and produced a cleaner construct. That is a strong outcome for publication because it shows transparency, methodological judgment, and robustness.

Practically, the findings suggest that engineering firms should not expect innovation systems to perform at their best if leadership remains purely transactional or if teams are psychologically detached from their work. Stronger innovation management is more likely when technical systems are supported by transformational leadership behaviors and by teams that remain engaged across project and improvement cycles.

## 6. Conclusion

This article examined the relationship between transformational leadership, team engagement, and innovation management in engineering and related firms. The findings show that transformational leadership positively affects innovation management and team engagement, while team engagement also positively predicts innovation management. Most importantly, team engagement partially mediates the relationship between transformational leadership and innovation management.

The article also contributes methodologically by showing that refinement of the innovation management scale improved measurement quality without changing the substantive pattern of the findings. Before item refinement, the six-item innovation scale showed weaker internal consistency. After removing the underperforming IM5 item, the reliability of the innovation management construct improved meaningfully, and the overall theoretical conclusions remained stable. As Table 6 demonstrates, the substantive interpretation of the model did not change after refinement. This strengthens confidence in the final model.

The broader implication is clear: innovation management in engineering firms should not be understood only as a technical issue. It is also a leadership issue and a people issue. Organizations that want stronger innovation

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outcomes should invest not only in systems and processes but also in transformational leadership behaviors and in work conditions that sustain team engagement.

## References


1. Bass, B. M. (1985). Leadership and performance beyond expectations. Free Press.
2. Breevaart, K., Bakker, A. B., Hetland, J., Demerouti, E., Olsen, O. K., & Espevik, R. (2014). Daily transactional and transformational leadership and daily employee engagement. Journal of Occupational and Organizational Psychology, 87(1), 138–157. https://doi.org/10.1111/joop.12041
3. Burns, J. M. (1978). Leadership. Harper & Row.
4. Calantone, R. J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. Industrial Marketing Management, 31(6), 515–524. https://doi.org/10.1016/S0019-8501(01)00203-6
5. Carless, S. A., Wearing, A. J., & Mann, L. (2000). A short measure of transformational leadership. Journal of Business and Psychology, 14(3), 389–405. https://doi.org/10.1023/A:1022991115523
6. Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE.
7. Denti, L., & Hemlin, S. (2012). Leadership and innovation in organizations: A systematic review of factors that mediate or moderate the relationship. International Journal of Innovation Management, 16(3), Article 1240007. https://doi.org/10.1142/S1363919612400075
8. Field, A. (2018). Discovering statistics using IBM SPSS Statistics (5th ed.). SAGE.
9. García-Morales, V. J., Jiménez-Barrionuevo, M. M., & Gutiérrez-Gutiérrez, L. (2012). Transformational leadership influence on organizational performance through organizational learning and innovation. Journal of Business Research, 65(7), 1040–1050. https://doi.org/10.1016/j.jbusres.2011.03.005
10. Hayes, A. F. (2022). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (3rd ed.). Guilford Press.

ISSN print/ 2769-1926 ISSN online/ 2769-1934

11. Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. Academy of Management Journal, 33(4), 692–724. https://doi.org/10.5465/256287
12. Kwon, K., & Kim, T. (2020). An integrative literature review of employee engagement and innovative behavior: Revisiting the JD-R model. Human Resource Management Review, 30(2), Article 100704. https://doi.org/10.1016/j.hrmr.2019.100704
13. Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. Educational and Psychological Measurement, 66(4), 701–716. https://doi.org/10.1177/0013164405282471
14. Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two-sample confirmatory factor analytic approach. Journal of Happiness Studies, 3(1), 71–92. https://doi.org/10.1023/A:1015630930326
15. Wang, G., Oh, I.-S., Courtright, S. H., & Colbert, A. E. (2011). Transformational leadership and performance across criteria and levels: A meta-analytic review of 25 years of research. Group & Organization Management, 36(2), 223–270. https://doi.org/10.1177/1059601111401017