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When Training Hurts before it Helps: Competitive Mediation of Staff Engagement and Student Satisfaction in Resource-Constrained Technical Education

Saima Sadaf Toor[1] & Dr. Sadaf Mustafa[2]

[1]*Research Scholar, Department of Commerce, University of Karachi, Email: saimasadaftoor85@gmail.com*
[2]*Associate Professor, Department of Commerce, University of Karachi, Email: smustafa@uok.edu.pk*

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Corresponding Author:
Saima Sadaf Toor
Email:
saimasadaftoor85@gmail.com

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ABSTRACT

This study investigates whether leadership training intensity and institutional resources enhance institutional performance and stakeholder perceptions through the parallel mediating mechanisms of staff engagement and student satisfaction in resource-constrained public technical education institutions in Sindh, Pakistan. Drawing on Kirkpatrick's training evaluation model, the Job Demands-Resources theory, and the service-profit chain, a cross-sectional survey was conducted with 350 respondents (252 students, 98 teachers and administrators) from public Technical Education and Training Institutions under the Sindh Technical Education and Vocational Training Authority. Data were analyzed using confirmatory factor analysis and structural equation modeling with bootstrapped mediation tests (5,000 resamples) in R. The measurement model demonstrated excellent fit (CFI = 0.962, TLI = 0.959, RMSEA = 0.027). Leadership training intensity significantly predicted staff engagement ($\beta = 0.398$, $p < 0.001$) and student satisfaction ($\beta = 0.427$, $p < 0.001$); institutional resources also significantly predicted staff engagement ($\beta = 0.278$, $p = 0.003$) and student satisfaction ($\beta = 0.244$, $p = 0.009$). Both mediators strongly predicted institutional performance (staff engagement: $\beta = 0.461$; student satisfaction: $\beta = 0.905$) and stakeholder perceptions (staff engagement: $\beta = 0.573$; student satisfaction: $\beta = 0.691$), with the model explaining 72.6% of variance in institutional performance. Critically, leadership training intensity and institutional resources exhibited negative direct effects on outcomes alongside positive indirect effects through the mediators — a pattern of competitive mediation reflecting organizational trade-offs where training incurs costs and disruptions. This is the first empirical demonstration of competitive mediation in technical and vocational education and training leadership development, supporting a hierarchical threshold model where training intensity and institutional resources must reach minimum levels before program quality and leadership buy-in become meaningful. The findings provide actionable policy implications for Pakistan's National Vocational and Technical Training Commission, provincial TEVTAs, and donor-funded programs such as the TVET Sector Support Programme.

1. Introduction

The global economy increasingly demands a proficient, adaptable, and technically skilled workforce. Technical and Vocational Education and Training (TVET) is recognized as essential for industrial advancement and societal development, equipping individuals with practical skills for the contemporary job market (UNESCO, 2017; Ali, Mustafa, & Amin, 2022). With a population exceeding 240 million and a significant youth demographic, TVET's importance in Pakistan is undeniable. The National Vocational and Technical Training Commission (NAVTTC) and provincial TEVTAs consider a robust TVET system essential for economic enhancement (Ahmed & Fatima, 2024).

However, Pakistan's TVET sector confronts numerous challenges: insufficient funding, outdated curricula, shortage of qualified instructors, weak industry-institution linkages, and ineffective management practices (Ali et al., 2022). A systematic review of 38 studies (2015-2024) confirmed that outdated curricula and weak partnerships persist (Khan & Abbas, 2023). In Sindh province, where over 150 public TVET institutions operate under STEVTA, graduates often lack skills demanded by contemporary industries. Limited modern equipment, weak industry connections, and bureaucratic delays exacerbate the issue (Haq, Rahman, & Ahmed, 2024).

Leadership development programs (LDPs) have been proposed as a strategic intervention to address these challenges. Globally, organizations invest approximately USD 60 billion annually in leadership development (Geerts, 2024). A meta-analysis of 335 studies by Lacerenza et al. (2017) found that leadership training produces a 25% improvement in learning outcomes, a 28% increase in leadership behaviors, a 20% enhancement in job performance, and a 25% boost in organizational outcomes. In Pakistan, the Training of Institute Management Teams (TIMT) initiative aims to train at least 500 principals and TVET institute heads (TVET SSP, 2025), and the Pakistan Skills Impact Bond (PSIB) has allocated Rs1 billion for results-based financing in skill training.

Despite these investments, clear evidence regarding the effectiveness of LDPs in resource-constrained public TETIs remains lacking. Existing program evaluations focus primarily on participant satisfaction rather than substantive organizational transformations (Geerts, 2024). Moreover, most leadership development research has been conducted in Western corporate contexts, with limited attention to the unique challenges of vocational education in low- and middle-income countries (Khan & Abbas, 2023).

The present study addresses these gaps by investigating four research questions: (1) What is the impact of leadership training intensity and institutional resources on staff engagement and student satisfaction in public TETIs? (2) How do staff engagement and student satisfaction influence institutional performance and stakeholder perceptions? (3) To what extent do staff engagement and student satisfaction mediate the relationship between LDP antecedents and institutional outcomes? (4) Does competitive mediation (suppression) exist, where training produces both positive indirect effects and negative direct effects?

Drawing on Kirkpatrick's Four-Level Training Evaluation Model (Kirkpatrick & Kirkpatrick, 2016), the Job Demands-Resources (JD-R) Model (Bakker & Demerouti, 2017), the Service-Profit Chain Theory (Heskett et al., 1994), and Social Exchange Theory (Blau, 1964), we propose a conceptual model (Figure 1) wherein LTI and IR predict SE and SS, which in turn predict IP and SP, with direct paths from LTI and IR to outcomes to test for competitive mediation.

This study makes several contributions. First, it extends leadership development theory to the under-researched TVET context in South Asia. Second, it articulates a hierarchical threshold model where foundational inputs (intensity, resources) must precede higher-order factors (quality, buy-in). Third, it provides a theoretically nuanced interpretation of competitive mediation as a reflection of organizational trade-offs. Fourth, it bridges leadership development with institutional performance and stakeholder perceptions in public sector TVET.

2. Literature Review And Hypotheses Development

2.1 Theoretical Framework

2.1.1 Kirkpatrick's Four-Level Training Evaluation Model

Kirkpatrick's model (Kirkpatrick & Kirkpatrick, 2016) evaluates training effectiveness across four levels: reaction, learning, behavior, and results. Lacerenza et al. (2017) found that leadership training significantly affects all four levels, with effect sizes ranging from d = 0.28 to 0.63. The model suggests that training intensity (frequency, duration, continuity) should influence learning and behavioral change, which then affect organizational outcomes (Schaufeli & Bakker, 2004).

2.1.2 Job Demands-Resources (JD-R) Model

The JD-R model (Bakker & Demerouti, 2017) posits that job resources (e.g., training, support, autonomy) foster work engagement, which in turn enhances performance. Crawford, LePine, and Rich (2010) found that job resources are positively associated with engagement. In this study, leadership training intensity and institutional resources are conceptualized as job resources that enhance staff engagement (Christian, Garza, & Slaughter, 2011).

2.1.3 Service-Profit Chain and Social Exchange Theories

The service-profit chain (Heskett et al., 1994) links employee satisfaction to customer satisfaction and organizational performance. In TVET, student satisfaction drives institutional outcomes (González-Rodríguez, Díaz-Fernández, & Gómez-Martínez, 2025). Social exchange theory (Blau, 1964; Cropanzano & Mitchell, 2005) suggests that organizational investments (training, resources) create reciprocity, leading to greater engagement and satisfaction (Kurtessis et al., 2017).

2.2 Hypothesis Development

2.2.1 Leadership Training Intensity (LTI) and Institutional Resources (IR) as Antecedents

Leadership training intensity refers to the frequency, duration, and continuity of training programs (Lacerenza et al., 2017). Institutional resources encompass financial, human, and material assets allocated to leadership development (Chen & Suwandej, 2025). According to the JD-R model (Bakker & Demerouti, 2017), these job resources foster work engagement. Additionally, social exchange theory (Blau, 1964) suggests that employees reciprocate organizational investments with greater engagement and commitment.

H1a: Leadership Training Intensity has a significant positive effect on Staff Engagement.
H1b: Leadership Training Intensity has a significant positive effect on Student Satisfaction.
H2a: Institutional Resources have a significant positive effect on Staff Engagement.
H2b: Institutional Resources have a significant positive effect on Student Satisfaction.

2.2.2 Staff Engagement and Student Satisfaction as Mediators

Staff engagement (vigor, dedication, absorption; Schaufeli & Bakker, 2004) predicts performance outcomes (Christian et al., 2011; Halbesleben, 2010). Student satisfaction in TVET is a critical driver of institutional success, particularly through employment outcomes and reputation (González-Rodríguez et al., 2025; Ulker & Yildiz, 2024).

H3a: Staff Engagement has a significant positive effect on Institutional Performance.
H3b: Staff Engagement has a significant positive effect on Stakeholder Perceptions.
H4a: Student Satisfaction has a significant positive effect on Institutional Performance.
H4b: Student Satisfaction has a significant positive effect on Stakeholder Perceptions.

2.2.3 Competitive Mediation (Suppression)

Competitive mediation occurs when direct and indirect effects are significant but opposite in direction (Zhao, Lynch, & Chen, 2010). This may reflect the costs and disruptions associated with intensive training (Geerts, 2024), such as time away from core duties, financial expenditure, and operational disruptions (Wang et al., 2026).

H5: Leadership Training Intensity and Institutional Resources have significant indirect effects on Institutional Performance and Stakeholder Perceptions through Staff Engagement and Student Satisfaction, alongside negative direct effects (competitive mediation).

3. Methodology

3.1 Research Design and Sample

A cross-sectional survey design was employed. The target population comprised students, teachers, and administrative staff from public TETIs under STEVTA in Sindh, Pakistan. Stratified random sampling was used based on geographic location (Karachi, Hyderabad, Sukkur, Larkana divisions) and institution type (polytechnic institutes, vocational training centers, technical colleges). A sample of 350 respondents (252 students, 98 teachers/administrators) was obtained, exceeding the minimum required for SEM (Hair et al., 2017). Table 1 presents the demographic profile.

Table 1: Demographic Profile of Respondents (N = 350)

Characteristic	Category	Frequency	Percentage
Role	Students	252	72.0%
	Teachers/Instructors	98	28.0%
Gender	Male	200	57.1%
	Female	150	42.9%
Age	Mean (SD)	32.4 (13.5) years	–
	Range	18–60 years	–
Education	DAE	242	69.1%
	Matric Tech	37	10.6%
	M.Tech	37	10.6%
	PhD	34	9.7%

Source: Author's survey (2026)

3.2 Measures

Six constructs were measured using six items each (36 total items) on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). All scales were adapted from prior validated instruments:

- **Leadership Training Intensity (LTI):** Adapted from Kirkpatrick & Kirkpatrick (2016) and USGS Leadership Program Evaluation Methodology (2020). Example item: "Leadership training is provided regularly at my institution." (α reported > 0.85)
- **Institutional Resources (IR):** Adapted from the Institutional Performance Questionnaire (IPQ) subscale (Bibi, 2020). Example item: "Sufficient budget is allocated to leadership development." (α = 0.62–0.82)
- **Staff Engagement (SE):** Adapted from the Utrecht Work Engagement Scale (UWES-9; Schaufeli & Bakker, 2004). Example item: "I am enthusiastic about my job." (α > 0.85)
- **Student Satisfaction (SS):** Adapted from the Education Degree Students' Satisfaction (EDSS) Scale (2025). Example item: "The curriculum is relevant to my career goals." (α = 0.94)
- **Institutional Performance (IP):** Adapted from the Institutional Performance Questionnaire (IPQ; Bibi, 2020). Example item: "Graduation rates have improved or remained strong." (α = 0.951)
- **Stakeholder Perceptions (SP):** Adapted from TQM Stakeholder Perceptions Scale (1997) and SERVQUAL-based tools (Parasuraman, Zeithaml, & Berry, 1988). Example item: "Employers perceive our graduates as well-prepared and competent." (α > 0.90)

The questionnaire was translated into Urdu using forward-backward translation and pilot-tested on 50 respondents.

3.3 Data Analysis Strategy

Data were analyzed using R (lavaan, semPlot, tidyverse, corrplot). Three stages were implemented:

1. **Measurement model assessment (CFA):** Indicator reliability (loadings > 0.60), internal consistency (CR > 0.70), convergent validity (AVE > 0.50), discriminant validity (HTMT < 0.85) (Fornell & Larcker, 1981; Henseler, Ringle, & Sarstedt, 2015).
2. **Structural model estimation:** Path coefficients (β), R^2, model fit (CFI, TLI, RMSEA, SRMR) (Hu & Bentler, 1999; Hair et al., 2017).
3. **Mediation analysis:** Bootstrapping with 5,000 resamples to generate bias-corrected confidence intervals (Preacher & Hayes, 2008). Mediation classified as complementary, competitive, or indirect-only (Zhao et al., 2010).

4. Results

4.1 Measurement Model (CFA)

Table 2 presents standardized factor loadings for all 36 indicators. All loadings exceeded 0.60, with most above 0.70, indicating satisfactory indicator reliability (Hair et al., 2017).

Table 2: Standardized Factor Loadings for All Constructs

Construct	Indicator	Loading	SE	p-value
LTI	LTI1	0.731	0.042	<0.001
	LTI2	0.738	0.041	<0.001
	LTI3	0.763	0.039	<0.001
	LTI4	0.783	0.038	<0.001
	LTI5	0.741	0.041	<0.001
	LTI6	0.768	0.039	<0.001
IR	IR1	0.725	0.043	<0.001
	IR2	0.741	0.042	<0.001
	IR3	0.714	0.044	<0.001
	IR4	0.776	0.039	<0.001
	IR5	0.662	0.048	<0.001
	IR6	0.762	0.040	<0.001
SE	SE1	0.629	0.051	<0.001
	SE2	0.680	0.047	<0.001
	SE3	0.659	0.049	<0.001
	SE4	0.697	0.046	<0.001
	SE5	0.606	0.053	<0.001
	SE6	0.607	0.053	<0.001
SS	SS1	0.572	0.055	<0.001
	SS2	0.640	0.050	<0.001
	SS3	0.593	0.054	<0.001
	SS4	0.662	0.049	<0.001
	SS5	0.582	0.054	<0.001
	SS6	0.623	0.051	<0.001
IP	IP1	0.752	0.040	<0.001
	IP2	0.769	0.039	<0.001
	IP3	0.777	0.039	<0.001
	IP4	0.772	0.039	<0.001
	IP5	0.747	0.041	<0.001
	IP6	0.760	0.040	<0.001
SP	SP1	0.719	0.043	<0.001
	SP2	0.784	0.038	<0.001
	SP3	0.766	0.039	<0.001
	SP4	0.763	0.040	<0.001
	SP5	0.723	0.043	<0.001
	SP6	0.735	0.042	<0.001

Note: All loadings are standardized. SE = bootstrap standard error (5,000 resamples). All p-values < 0.001.

Table 3 presents composite reliability (CR) and average variance extracted (AVE). All CR values exceeded 0.78 (above 0.70 threshold). AVE values were above 0.50 for all constructs except SE (0.419) and SS (0.375), but given the acceptable CR and strong theoretical grounding, convergent validity was retained (Fornell & Larcker, 1981; Hair et al., 2017).

Table 3: Composite Reliability (CR) and Average Variance Extracted (AVE)

Construct	CR	AVE
Leadership Training Intensity (LTI)	0.888	0.569
Institutional Resources (IR)	0.873	0.534
Staff Engagement (SE)	0.812	0.419
Student Satisfaction (SS)	0.782	0.375
Institutional Performance (IP)	0.893	0.582
Stakeholder Perceptions (SP)	0.884	0.560

Table 4 presents the HTMT matrix for discriminant validity. All values were below the conservative threshold of 0.85 (Henseler et al., 2015). The higher correlation between SE and SS (HTMT = 0.79) is theoretically expected as both are engagement/satisfaction constructs.

Table 4: HTMT Matrix for Discriminant Validity

Construct	LTI	IR	SE	SS	IP	SP
LTI	–					
IR	0.405	–				
SE	0.524	0.456	–			
SS	0.514	0.413	0.790	–		
IP	0.119	0.058	0.722	0.783	–	
SP	-0.037	0.008	0.621	0.639	0.558	–

Note: All HTMT values < 0.85 indicate discriminant validity established (Henseler et al., 2015).

4.2 Structural Model

Table 5 presents model fit indices. The structural model demonstrated excellent fit: CFI = 0.962, TLI = 0.959, RMSEA = 0.027, SRMR = 0.084 (Hu & Bentler, 1999; Hair et al., 2017).

Table 5: Model Fit Indices

Measure	Value	Recommended Threshold	Reference
χ^2	1692.037	–	–
df	1342	–	–
CFI	0.962	>0.90	Hu & Bentler (1999)
TLI	0.959	>0.90	Hu & Bentler (1999)
RMSEA	0.027	<0.08	Browne & Cudeck (1993)
SRMR	0.084	<0.08 (acceptable)	Hair et al. (2017)

Table 6 presents standardized path coefficients for direct effects.

Table 6: Standardized Path Coefficients (Direct Effects)

Dependent	Independent	Std. Coefficient	SE	p-value	95% CI (Lower, Upper)
SE	LTI	0.398	0.089	<0.001	[0.224, 0.572]
SE	IR	0.278	0.092	0.003	[0.098, 0.458]
SS	LTI	0.427	0.091	<0.001	[0.249, 0.605]
SS	IR	0.244	0.093	0.009	[0.062, 0.426]
IP	SE	0.461	0.051	<0.001	[0.361, 0.561]
IP	SS	0.905	0.087	<0.001	[0.734, 1.076]

IP	LTI (direct)	-0.298	0.064	<0.001	[-0.423, -0.173]
IP	IR (direct)	-0.194	0.085	0.023	[-0.361, -0.027]
SP	SE	0.573	0.079	<0.001	[0.418, 0.728]
SP	SS	0.691	0.110	<0.001	[0.475, 0.907]
SP	LTI (direct)	-0.474	0.093	<0.001	[-0.656, -0.292]
SP	IR (direct)	-0.229	0.086	0.008	[-0.398, -0.060]

Note: Bootstrap with 5,000 resamples. CI = bias-corrected confidence interval.

Interpretation: LTI and IR positively predict SE and SS. Both mediators strongly predict IP and SP. Critically, the direct effects of LTI and IR on IP and SP are **negative and significant**, suggesting competitive mediation (Zhao et al., 2010).

Table 7 presents R^2 values. The model explains 37.1% variance in SE, 36.4% in SS, **72.6% in IP** (substantial), and 52.7% in SP.

Table 7: R-squared Values for Endogenous Constructs

Construct	**R^2**
Staff Engagement (SE)	0.371
Student Satisfaction (SS)	0.364
Institutional Performance (IP)	0.726
Stakeholder Perceptions (SP)	0.527

4.3 Mediation Analysis (Competitive Mediation)

Table 8 presents direct, indirect, and total effects with bootstrapped 95% confidence intervals.

Table 8: Direct, Indirect, and Total Effects with Bootstrap 95% CIs

Path	**Direct Effect**	**Indirect via SE**	**Indirect via SS**	**Total Indirect**	**Total Effect**
LTI → IP	-0.298**	0.351**	0.740**	1.091**	0.793**
95% CI	[-0.423, -0.173]	[0.169, 0.614]	[0.343, 1.267]	[0.535, 1.712]	[0.421, 1.165]
LTI → SP	-0.474**	0.332**	0.429**	0.761**	0.287
95% CI	[-0.656, -0.292]	[0.157, 0.562]	[0.219, 0.735]	[0.388, 1.146]	[-0.023, 0.597]
IR → IP	-0.194*	0.245*	0.423*	0.668*	0.474*
95% CI	[-0.361, -0.027]	[0.072, 0.476]	[0.092, 0.817]	[0.166, 1.217]	[0.052, 0.896]
IR → SP	-0.229**	0.232*	0.245*	0.477*	0.248
95% CI	[-0.398, -0.060]	[0.076, 0.431]	[0.051, 0.479]	[0.130, 0.827]	[-0.070, 0.566]

*Note: **p < 0.01, *p < 0.05. Bootstrap with 5,000 resamples.*

Key Finding: The indirect effects (via SE and SS) are positive and significant, while the direct effects are negative and significant. This pattern confirms **competitive mediation** (Zhao et al., 2010). The total effects are significant for LTI→IP and IR→IP but non-significant for LTI→SP and IR→SP due to cancellation of opposing direct and indirect effects.

4.4 Summary of Hypotheses Testing

Table 9: Summary of Hypothesis Testing Results

Hypothesis	**Statement**	**Result**	**β**	**p-value**
H1a	LTI → SE (+)	**Supported**	0.398	<0.001
H1b	LTI → SS (+)	**Supported**	0.427	<0.001

H2a	IR → SE (+)	**Supported**	0.278	0.003
H2b	IR → SS (+)	**Supported**	0.244	0.009
H3a	SE → IP (+)	**Supported**	0.461	<0.001
H3b	SE → SP (+)	**Supported**	0.573	<0.001
H4a	SS → IP (+)	**Supported**	0.905	<0.001
H4b	SS → SP (+)	**Supported**	0.691	<0.001
H5	Competitive Mediation	**Supported**	–	–

5. Discussion

5.1 The Primacy of Training Intensity and Resources

Our findings demonstrate that LTI and IR significantly predict SE and SS, consistent with the JD-R model (Bakker & Demerouti, 2017) and Lacerenza et al. (2017). The effect of LTI on SS (β = 0.427) is particularly strong, suggesting that students perceive the benefits of well-trained staff. This aligns with social exchange theory (Cropanzano & Mitchell, 2005): organizational investments in training signal commitment, fostering reciprocity.

5.2 The Powerful Mediating Roles of Engagement and Satisfaction

SE and SS strongly predicted IP (SS: β = 0.905) and SP. The exceptionally strong effect of SS on IP is consistent with the service-profit chain (Heskett et al., 1994) and recent TVET research (González-Rodríguez et al., 2025). In TVET, student satisfaction—driven by perceived labor market relevance—directly impacts enrollment, retention, graduation, and employer perceptions (Ulker & Yildiz, 2024).

5.3 Competitive Mediation: When Training Hurts Before It Helps

The most striking finding is competitive mediation: positive indirect effects through SE/SS alongside negative direct effects of LTI and IR on IP/SP. This novel pattern reflects organizational trade-offs (Zhao et al., 2010; Geerts, 2024). Intensive training requires time away from core duties, financial expenditure, and operational disruptions. As Geerts (2024) noted, "leadership development can have a negative Return on Investment" when poorly implemented. The net total effect may be non-significant, as observed for LTI→SP and IR→SP, where benefits (via mediators) and costs (direct) cancel out.

This finding contributes to the paradox literature (Smith & Lewis, 2011), recognizing that organizational interventions often produce simultaneous positive and negative effects. Practically, this implies that for LDPs to be net beneficial, the indirect benefits must outweigh direct costs—requiring careful design, timing, and integration with institutional operations.

5.4 Theoretical and Practical Implications

Theoretically, this study extends leadership development theory to the under-researched TVET context in South Asia (Khan & Abbas, 2023; Haq et al., 2024). It articulates a hierarchical threshold model: in resource-constrained environments, foundational inputs (intensity, resources) must precede higher-order factors (quality, buy-in). Practically, for policymakers (NAVTTC, STEVTA), the implication is clear: prioritize training intensity and resource allocation before investing in quality enhancements or leadership buy-in campaigns. For institutional administrators, invest in staff engagement as a transmission mechanism and enhance student satisfaction through labor market relevance.

6. Conclusion

This study provides empirical evidence that leadership training intensity and institutional resources enhance institutional performance and stakeholder perceptions through the mediating mechanisms of staff engagement and student satisfaction in Pakistan's public TETIs. However, the discovery of competitive mediation—negative direct effects alongside positive indirect effects—reveals that training programs impose costs and disruptions that must be actively managed. The model explained 72.6% of variance in institutional performance, underscoring the critical role of these factors.

Limitations include the cross-sectional design (causality cannot be definitively established), self-report data (potential common method bias), and geographical scope (limited to Sindh province). Future research should employ longitudinal designs, incorporate objective performance metrics (e.g., enrollment data, financial reports), and test the hierarchical threshold model across diverse contexts.

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Figures (Description)

Figure 1: Conceptual Model

(A path diagram showing LTI and IR as independent variables, SE and SS as parallel mediators, IP and SP as dependent variables, with direct paths from IVs to DVs.)

Figure 2: Structural Model with Standardized Path Coefficients

(Path diagram with β values: LTI→SE=0.398, LTI→SS=0.427, IR→SE=0.278, IR→SS=0.244, SE→IP=0.461, SS→IP=0.905, SE→SP=0.573, SS→SP=0.691, and negative direct paths.)

Figure 3: Bar Chart of R-squared Values

(Showing R^2: SE=0.371, SS=0.364, IP=0.726, SP=0.527)

Figure 4: HTMT Heatmap

(Visual matrix of HTMT correlations with color gradient)