



The Influence of Employee Silence on Innovation Performance

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Abstract

Background and Aims: Innovation performance is a strategic capability that determines organizational competitiveness from the perspective of the Resource-Based View (RBV) and knowledge management theory. Employee silence, defined as the intentional withholding of opinions or suggestions, undermines this capability by restricting information flow and reducing individual creativity.

Methodology: This study investigates the mechanisms linking employee silence and innovation performance, focusing on the mediating role of psychological safety and the moderating effect of self-efficacy. Data were collected from 419 employees across various Chinese industries, and structural equation modeling (SEM) was employed to test the hypotheses.

Results: The results reveal three key findings: (1) employee silence significantly reduces innovation performance directly; (2) psychological safety partially mediates this relationship, showing that silence indirectly inhibits innovation by lowering employees' confidence in voicing ideas; and (3) self-efficacy negatively moderates the effect of psychological safety on innovation performance, such that high self-efficacy weakens the positive influence of psychological safety.

Conclusion: The study contributes theoretically by enriching organizational behavior research with a psychological mechanism and boundary condition model, and practically by providing insights for managers to foster open communication, strengthen psychological safety, and enhance employee self-efficacy. These findings extend existing literature on employee voice and innovation performance and offer actionable strategies for building supportive and innovative organizational environments.

Keywords: Employee Silence; Innovation Performance; Psychological Safety; Self-efficacy; Organizational Behavior; Employee Voice

Introduction

In today's dynamic and competitive business landscape, innovation has become the key driver for corporate survival and sustainable growth. Organizations increasingly rely on employees as primary innovators, where their knowledge, attitudes, and behaviors directly determine innovation outcomes. From the perspective of the Resource-Based View (RBV) and knowledge





management theory, innovation is not only the outcome of individual creativity but also a strategic capability that enhances long-term competitiveness. However, despite the widely recognized importance of employee contributions, silencing behavior remains prevalent in organizations. Employee silence refers to intentional concealment of opinions, suggestions, or concerns in the workplace due to fear of negative evaluations, lack of trust, or desire to maintain harmony. As Morrison and Milliken (2000) argued in their theory of organizational silence, such behaviors reflect systemic barriers to change. From a social exchange perspective, silence can also signal weakened trust in leadership and deteriorating communication climates. This behavior prevents companies from fully harnessing employees' wisdom and creativity, often leading to missed improvement opportunities and declining innovation capabilities.

The significance of studying employees' silence stems from its dual impact on individuals and organizations. On one hand, silence impedes the free flow of knowledge and diminishes personal initiative, thereby weakening conditions essential for innovation. On the other hand, silence often reflects deeper organizational issues such as communication barriers or a lack of psychological safety. In this sense, silence not only reduces feedback loops and information sharing but also directly constrains the psychological foundation for innovation. Existing research emphasizes that psychological safety serves as a crucial factor in motivating employees to voice opinions and actively participate in innovation. Furthermore, self-efficacy influences how employees translate psychological safety into innovative outcomes, mediating the relationship between psychological safety and innovation performance to some extent.

Theoretical analysis reveals that while organizational behavior research has extensively examined employee attitudes and performance, studies exploring the mechanisms linking silence behaviors to innovation performance remain relatively limited. Current research predominantly focuses on the antecedents and general consequences of silence, yet lacks in-depth exploration of its specific pathways—particularly regarding the mediating role of psychological safety and the moderating effect of self-efficacy. Psychological safety, as defined by Edmondson (1999), explains why employees are willing to express new ideas without fear of negative consequences, while self-efficacy, from Bandura's (1977) theory, highlights why some employees maintain innovation even under less supportive climates. These two constructs were therefore selected for their explanatory power in clarifying both the mechanism and the boundary conditions of silence. Addressing this research gap will not only enrich theoretical frameworks in organizational behavior and innovation management but also deepen our understanding of how psychological mechanisms influence employees' innovative contributions.

From a practical perspective, clarifying the mechanisms linking silent behavior, psychological safety, and self-efficacy can provide actionable insights for corporate management. Creating open

communication environments, establishing effective feedback systems, and enhancing employees' psychological safety can reduce silent behavior while unleashing innovative potential. Simultaneously, boosting employees' self-efficacy helps mitigate the negative impacts of silence and further stimulates creativity. Therefore, this study not only advances theoretical understanding but also holds practical value for management practice.

Building on these considerations, this study investigates how employee silence behaviors influence individual innovation performance through psychological safety and self-efficacy. Specifically, it asks: to what extent does silence directly inhibit innovation, how does psychological safety mediate this process, and in what way does self-efficacy moderate the relationship between psychological safety and innovation performance? By integrating these questions into a unified framework, this study provides empirical evidence and theoretical contributions, while offering practical recommendations for organizational management practices.

Objectives

To examine the direct effect of employee silence on individual innovation performance within organizational contexts.

To investigate the mediating role of psychological safety in explaining how employee silence influences innovation performance.

To analyze the moderating effect of self-efficacy on the relationship between psychological safety and innovation performance, clarifying the boundary conditions of this mechanism.

To distinguish the differential impacts of silence by explicitly identifying both direct behavioral consequences (reduced knowledge sharing) and indirect psychological consequences (weakened psychological safety) on innovation outcomes.

Literature Review

Research on employee silence has gained increasing attention in the field of organizational behavior. Silence is not merely "keeping quiet," but rather a complex behavioral choice often stemming from fear, lack of trust, or the perception that speaking out would be futile. Scholars categorize it into defensive silence, acquiescent silence, prosocial silence, and opportunistic silence, each with distinct motivations and consequences. Defensive silence typically arises from concerns about punishment, while acquiescent silence is frequently associated with low organizational commitment. Although these behaviors may maintain superficial harmony in the short term, they hinder information exchange and stifle innovation (Morrison & Milliken, 2000; Tangirala & Ramanujam, 2008). Beyond these classifications, social exchange theory and psychological contract theory provide additional explanations of why silence persists—



employees may remain silent when they perceive imbalance in reciprocity or when they believe the organization has failed to fulfill implicit obligations. This enriches the theoretical understanding of silence as both an individual coping mechanism and an organizational symptom.

Innovation performance, defined as employees' ability to generate, promote, and implement new ideas, serves as a vital source of organizational competitiveness. Research indicates that this capability is influenced not only by individual skills and motivations but also by organizational culture and leadership styles. Organizations that foster risk-taking and knowledge-sharing demonstrate stronger innovation outcomes, while overly restrictive environments tend to diminish employee creativity and initiative (Scott & Bruce, 1994; Agostineto et al., 2022). Recent studies highlight that transformational leadership and learning-oriented cultures significantly enhance employee voice and mitigate silence (Duan et al., 2018; Lam, 2019), suggesting that leadership context is crucial in shaping innovation outcomes.

Psychological safety serves as a crucial mediating variable bridging organizational culture and individual behavior. It reflects employees' psychological state where they feel secure expressing opinions, taking risks, and innovating without fearing negative consequences. Strong psychological safety fosters open communication, teamwork, and innovation, while its absence exacerbates silence and stifles creative initiatives (Edmondson, 1999). When psychological safety is low, employees are less willing to share knowledge, thereby weakening innovation processes; however, individuals with higher self-efficacy may still engage in risk-taking behaviors, buffering the negative consequences. This illustrates how individual psychological resources interact with organizational conditions.

Self-efficacy, a seminal concept introduced by Albert Bandura (1977), refers to an individual's belief in their ability to accomplish specific tasks. Employees with high self-efficacy demonstrate greater resilience when facing challenges and actively engage in innovative activities. Research indicates that self-efficacy interacts with situational factors such as psychological safety, collectively influencing innovative behaviors while serving as a buffer against adverse environmental impacts (Stajkovic & Luthans, 1998). However, while high self-efficacy can motivate risk-taking, some scholars caution that it may also reduce reliance on supportive climates, thereby weakening the positive role of psychological safety (Wu, 2023). This contradictory evidence shows that self-efficacy's role is conditional and requires empirical testing.

Despite ongoing research advancements, several limitations persist. Firstly, most studies treat silence as a monolithic variable, with limited exploration of its specific mechanisms in undermining innovation performance. Secondly, while psychological safety and self-efficacy have been established as innovation-related factors, few studies integrate them into a unified analytical framework to reveal how silence influences innovation outcomes through psychological





processes. Building on these findings, this study proposes that psychological safety mediates the relationship between employee silence and innovation performance, while self-efficacy moderates this mediating role, thereby establishing a more systematic analytical model. This gap matters because silence has both behavioral and psychological dimensions: the behavioral withholding of ideas and the psychological erosion of safety. Combining psychological safety and self-efficacy offers a more dynamic model that explains not only how silence suppresses innovation but also when and for whom these effects are most pronounced.

In summary, employee silence reduces innovation by limiting knowledge exchange and weakening psychological safety, while self-efficacy shapes how individuals respond to these conditions. By integrating silence theory with organizational behavior frameworks and linking psychological safety and self-efficacy into a single model, this study proposes a more comprehensive explanation of how silence influences innovation performance. This integration provides the theoretical basis for the hypotheses tested in the following sections.

Methodology

This study adopts a quantitative research design to explore the relationship between employees' silence behavior and innovation performance, and focuses on the mediating role of psychological safety and the moderating role of self-efficacy. A quantitative design was chosen because it allows for hypothesis testing within a positivist research tradition, providing statistical evidence on causal relationships among variables. While qualitative or mixed methods could generate richer insights into individual experiences, the quantitative approach is more suitable for validating the theoretical model through structural equation modeling (SEM).

1. Study design and sample

The study collected data through structured questionnaires, with respondents being employed staff from various industries in China. To ensure sample representativeness, participants were required to have at least one year of work experience. The questionnaire was distributed through a combination of online and offline methods, resulting in the collection of 419 valid responses, with a sample size meeting the requirements for structural equation modeling (SEM) analysis. A non-probability convenience sampling approach was used, as access to employees across industries was limited. Although this sampling technique facilitates data collection, it may introduce bias by underrepresenting certain sectors. Future studies could adopt stratified random sampling to improve generalizability.

All participants were informed about the purpose of the study, provided informed consent, and assured of confidentiality and anonymity. The study followed ethical research guidelines and obtained approval from the university's research ethics committee.



2. Variable measurement

The study adopted mature scales from domestic and international sources and modified them to fit the Chinese context. The employee silence scale was based on the instrument proposed by Dyne, Ang, and Botero (2003) and revised by Tangirala and Ramanujam (2008); psychological safety was measured using Edmondson's (1999) scale; innovation performance utilized the instrument revised by Scott and Bruce (1994) as well as Kim (2024); self-efficacy employed the universal self-efficacy scale developed by Schwarzer and Jerusalem (1995). The reliability and validity test results indicated that the scales demonstrated good psychometric properties. To ensure cultural validity in the Chinese context, a back-translation procedure was applied, followed by expert review and pilot testing with 30 employees. Feedback confirmed semantic equivalence and contextual relevance.

All items were rated using a five-point Likert scale (1= "strongly disagree", 5= "strongly agree"). Cronbach's α values exceeded 0.70 for all scales. In addition, composite reliability (CR) and average variance extracted (AVE) were calculated, and both met recommended thresholds, supporting convergent validity. KMO and Bartlett's test results also confirmed the suitability of the data for factor analysis.

Since self-report measures were used, potential common method bias (CMB) was addressed by procedural remedies, such as randomizing item order. Post hoc, Harman's single-factor test and confirmatory factor analysis (CFA) verified that no single factor accounted for most variance, indicating that CMB was not a serious concern.

3. Data analysis

The data analysis was conducted using SPSS 26.0 and AMOS 24.0. First, descriptive statistics and correlation analyses were performed to understand sample characteristics and relationships between variables. Subsequently, confirmatory factor analysis (CFA) was used to test measurement validity, while structural equation modeling (SEM) was employed to verify direct effects, mediating effects, and moderating effects. The mediating role of psychological safety was examined through a bias-corrected Bootstrap method, while the moderating effect of self-efficacy was assessed via interaction term analysis. Model fit indices (including CFI, TLI, RMSEA, and χ^2/df) all indicated good model fit.

SEM was chosen because it enables simultaneous testing of complex relationships involving direct, mediating, and moderating effects, which aligns with the theoretical model integrating employee silence, psychological safety, self-efficacy, and innovation performance.

Before analysis, data were screened for missing values, normality, multicollinearity, and outliers. Cases with excessive missing responses were excluded, while standardized residuals and



Mahalanobis distance were used to identify outliers. Variance inflation factors (VIF) confirmed that multicollinearity was not problematic. These steps ensured compliance with SEM assumptions. Missingness below 5% per item was listwise deleted; standardized residuals $|z| > 3.29$ and Mahalanobis $p < .001$ flagged multivariate outliers for review. Normality was inspected via skewness/kurtosis ($|sk| < 2$, $|ku| < 7$) and residual plots; $VIF < 5$ indicated acceptable multicollinearity.

4. Model construction

In the context of rapid development in the knowledge economy, individual innovation performance has become a crucial source of organizational competitiveness. Silence behavior, a prevalent phenomenon in organizations, refers to employees' tendency to withhold genuine thoughts due to fear, helplessness, or relational maintenance. According to social exchange theory, silence reflects weakened trust between employees and organizations, thereby suppressing information sharing and innovative thinking, ultimately negatively impacting personal innovation performance. Simultaneously, silence diminishes individuals' sense of security in the work environment, further exacerbating the loss of innovation motivation. Psychological safety serves as a mediating factor between silence behavior and personal innovation performance. Based on social cognitive theory, psychological safety encourages employees to express novel ideas and take risks in innovation, acting as a key psychological condition for stimulating innovative behaviors. When silence reduces psychological safety, employees' willingness and capacity to engage in innovative activities also decrease. Additionally, self-efficacy—as an individual's belief in their ability to accomplish tasks—moderates the impact of psychological safety on innovation performance. Employees with high self-efficacy can maintain strong innovation enthusiasm even in environments with low psychological safety, thereby partially mitigating the negative effects of silence behavior.

Through literature review and analysis of research variables, this study proposes a theoretical model with silent behavior as the independent variable, individual innovation performance as the dependent variable, psychological safety as the mediating variable, and self-efficacy as the moderating variable. The model reveals the internal mechanisms and boundary conditions through which employees' silent behavior influences innovation performance, providing a new theoretical perspective for advancing innovation behavior research. The theoretical model is illustrated in Figure 1:



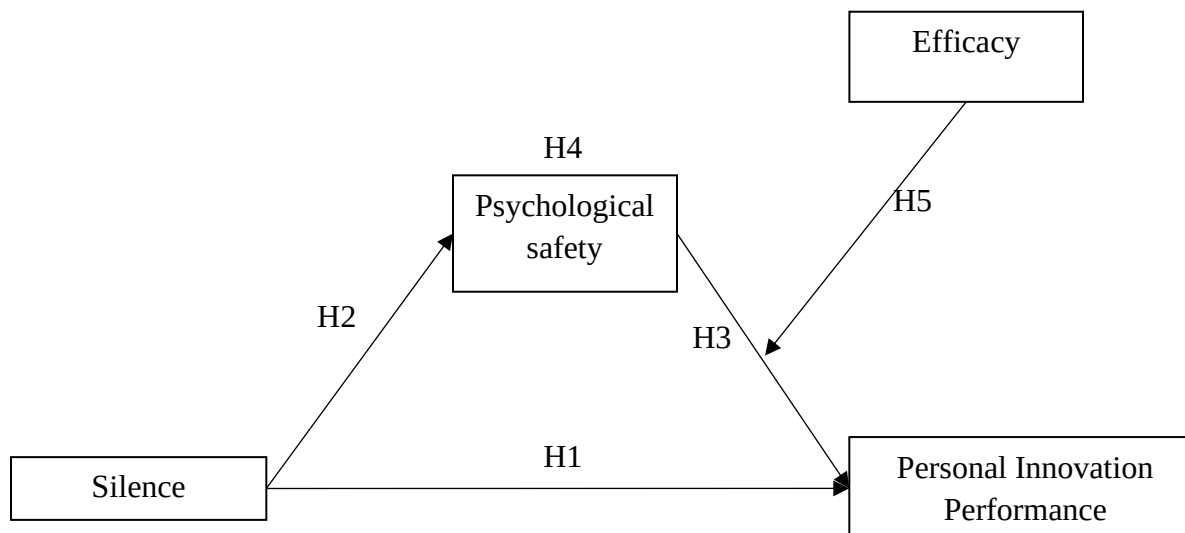


Figure 1 Theoretical model diagram

Based on Edmondson's (1999) psychological safety framework, silence undermines employees' confidence to express new ideas, while Bandura's (1977) social cognitive theory explains how self-efficacy moderates this process. These theoretical underpinnings guided the formulation of hypotheses H1–H5.

H1: Employee silence has a significant negative impact on innovation performance.

H2: Employees' silence behavior has a significant negative impact on psychological safety.

H3: Psychological safety has a significant positive impact on innovation performance.

H4: Psychological safety plays a mediating role between employees' silence behavior and innovation performance.

H5: Self-efficacy regulates the relationship between psychological safety and innovation performance, that is, the positive effect of psychological safety on innovation performance is weaker among employees with high self-efficacy and stronger among employees with low self-efficacy.

Results

This study conducted a systematic descriptive analysis of the basic characteristics of the valid sample, comprising 419 employed employees. The gender distribution shows female participants slightly outnumbering males, with 217 women (51.79%) and 202 men (48.21%). Age structure reveals a mid-career dominance pattern: those aged 36-45 form the largest group at 185 individuals (44.15%), followed by 101 people aged 18-25 (24.11%) and 89 individuals aged 26-35 (21.24%). Senior employees aged 46 and above account for 10.50%, totaling 44 individuals. Educational background highlights knowledge-intensive characteristics: bachelor's degree holders



constitute the majority at 205 individuals (48.93%), master's degree holders (102 individuals, 24.34%), college graduates (78 individuals, 18.62%), and high school graduates or below (34 individuals, 8.11%). Work experience data reflects seniority advantages: 216 employees with over 10 years of experience form the majority (51.55%), followed by 68 with 1-3 years (16.23%), 41 with 7-10 years (9.79%), 39 with 4-6 years (9.31%), and 55 recruits with less than 1 year (13.13%).

Table 1 Descriptive statistical analysis of samples

variable		frequency	percentage
sex	man	202	48.21%
	woman	217	51.79%
age	18-25 years	101	24.11%
	26-35 years	89	21.24%
	36-45 years	185	44.15%
	46 years and above	44	10.50%
education	High school and below	34	8.11%
	junior college	78	18.62%
	undergraduate course	205	48.93%
	Master's degree or above	102	24.34%
length of service	Less than 1 year	55	13.13%
	1-3 years	68	16.23%
	4-6 years	39	9.31%
	7-10 years	41	9.79%
	10 years or more	216	51.55%

Cronbach's α coefficients for all scales exceeded 0.70, demonstrating acceptable internal consistency: Employee Silence ($\alpha = 0.792$), Psychological Safety ($\alpha = 0.776$), Innovation Performance ($\alpha = 0.823$), and Self-Efficacy ($\alpha = 0.818$). Composite reliability (CR) values also exceeded 0.70, while average variance extracted (AVE) values were mostly above 0.50. The AVE of Innovation Performance was lower (0.372), suggesting room for refinement. KMO and Bartlett's tests indicated the data were suitable for factor analysis.

Table 2 Scale reliability analysis

scale	Cronbach's α	number of terms
Silence	0.792	4



scale	Cronbach's α	number of terms
Psychological safety	0.776	3
Innovation performance	0.823	8
efficacy	0.818	7

Table 3 Test of combined reliability and convergent validity

path relationship			Estimate (standardized factor loadings)	CR (combined reliability)	AVE (average number of variance samples)
SB1	<---	Silence	0.703	0.792	0.488
SB2	<---	Silence	0.679		
SB3	<---	Silence	0.703		
SB4	<---	Silence	0.709		
PS1	<---	Psychological safety	0.741	0.777	0.537
PS2	<---	Psychological safety	0.729		
PS3	<---	Psychological safety	0.729		
IP1	<---	Innovation performance	0.544	0.824	0.372
IP2	<---	Innovation performance	0.570		
IP3	<---	Innovation performance	0.666		
IP4	<---	Innovation performance	0.663		
IP5	<---	Innovation performance	0.553		
IP6	<---	Innovation performance	0.568		



path relationship			Estimate (standardized factor loadings)	CR (combined reliability)	AVE (average number of variance samples)
IP7	<---	Innovation performance	0.596		
IP8	<---	Innovation performance	0.696		
SE1	<---	efficacy	0.620		
SE2	<---	efficacy	0.563		
SE3	<---	efficacy	0.613		
SE4	<---	efficacy	0.681	0.819	0.393
SE5	<---	efficacy	0.663		
SE6	<---	efficacy	0.623		
SE7	<---	efficacy	0.621		

Table 4 Discrimination validity tests

variable	Silence	Psychological safety	Innovation performance	efficacy
Silence	0.699			
Psychological safety	-0.342	0.733		
Innovation performance	-0.612	0.577	0.610	
efficacy	0.083	-0.034	-0.028	0.627

Note: The diagonal is the square root of AVE

Pearson correlation analysis revealed significant correlations among key variables. Silence behavior correlated negatively with psychological safety ($r = -0.269$, $p < 0.01$) and innovation performance ($r = -0.503$, $p < 0.01$), while psychological safety correlated positively with innovation performance ($r = 0.463$, $p < 0.01$). VIF values were below 5, indicating no serious multicollinearity. Normality, residual plots, and Durbin–Watson statistics supported regression assumptions.

Table 5 Relevance test

variable	Silence	Psychological safety	Innovation performance	efficacy
Silence	1			
Psychological safety	-.269**	1		
Innovation performance	-.503**	.463**	1	
efficacy	0.064	-0.028	-0.024	1

** . At the 0.01 level (double-tailed), the correlation is significant.

The structural equation modeling (SEM) path diagram illustrates the relationship between employees' silent behavior, psychological safety, and innovation performance. The model reveals that employees' silent behavior negatively impacts innovation performance through psychological safety as a mediating variable, with silent behavior exerting this negative influence both directly and indirectly via psychological safety.

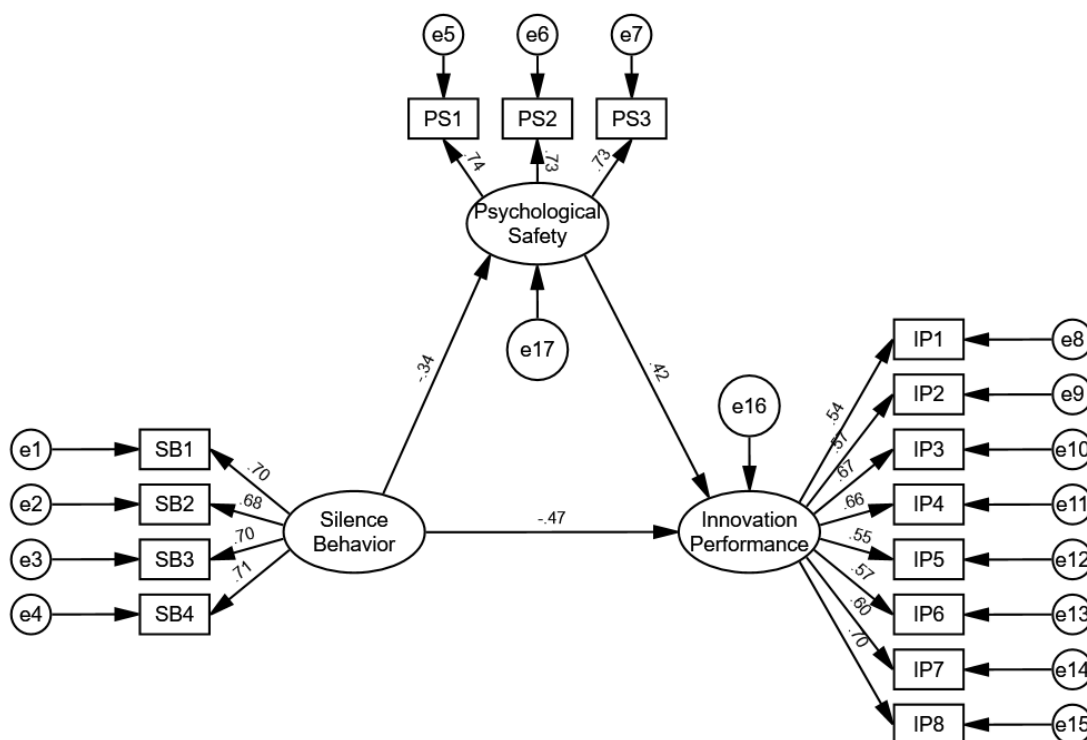


Figure 2 Structural Equation Model (SEM) pathway

Structural equation modeling (SEM) showed that employee silence negatively affected innovation performance ($\beta = -0.469$, $p < 0.001$). Silence also negatively predicted psychological safety ($\beta = -0.342$, $p < 0.001$), while psychological safety positively predicted innovation performance ($\beta = 0.417$, $p < 0.001$).

Table 6 Path hypothesis tests

path relationship			Estimate	Std Estimate	S.E.	C.R.	P
Innovation performance	<---	Silence	-0.281	-0.469	0.042	-6.741	***
Innovation performance	<---	Psychological safety	0.277	0.417	0.044	6.265	***
Psychological safety	<---	Silence	-0.308	-0.342	0.058	-5.268	***

Bootstrap tests confirmed a partial mediating role of psychological safety. The indirect effect of silence on innovation performance was significant ($\beta = -0.063$, 95% CI = [-0.092, -0.038]), accounting for 19% of the total effect. Direct and total effects remained significant.

Table 7 Results of the mediation test of psychological safety

Variable path		β (se)	t	p	95% CI	R ²	F(df)
X→M	SB→PS	-0.245 (0.043)	-5.714	0.000	[-0.329, -0.160]	0.073	32.654 (1,417)
	constant	4.517 (0.153)	29.534	0.000	[4.216, 4.817]		
X+M→Y	SB→IP	-0.271 (0.027)	-10.066	0.000	[-0.324, -0.218]	0.368	121.353 (2,416)
	PS→IP	0.260 (0.030)	8.737	0.000	[0.201, 0.318]		
	constant	3.068 (0.163)	18.810	0.000	[2.748, 3.389]		
gross effect	SB→IP	-0.335 (0.028)	-11.870	0.000	[-0.390, -0.279]	0.253	140.904 (1,417)
	constant	4.241 (0.101)	42.068	0.000	[4.043, 4.439]		

Table 8 Decomposition of the mediating effect of psychological safety

Type of effect	Effect value	standard error SE	Lower limit of 95% (LLCI)	Upper limit of 95% (ULCI)	Effectiveness ratio
gross effect c	-0.334	0.028	-0.390	-0.279	100%
direct effect c'	-0.271	0.027	-0.324	-0.218	81%
indigo effect axb	-0.063	0.014	-0.092	-0.038	19%

The interaction between psychological safety and self-efficacy was significant ($\beta = -0.106$, $p = 0.003$). Simple slope analysis showed that the effect of psychological safety on innovation performance decreased as self-efficacy increased: $\beta = 0.317$ (low), $\beta = 0.231$ (mean), and $\beta = 0.144$ (high).

Table 9 Test results of the self-efficacy regulation effect

predictive variable	β (se)	t	p	95% CI	R ² (ΔR^2)	F
constant term	3.101 (0.023)	136.673	0.000	[3.057, 3.146]		
PS (X)	0.231 (0.028)	8.139	0.000	[0.175, 0.287]		
SE (W)	0.349 (0.028)	12.525	0.000	[0.294, 0.404]		
PS $\times$ SE (interaction)	-0.106 (0.036)	-2.951	0.003	[-0.177, -0.036]	0.012**	8.710**
Model overall			0.000		0.437	107.365***

Table 10 Simple slope analysis of the moderating effect of self-efficacy

SE horizontal	Effect	se	t	p	Lower 95%CI	95%CI upper limit
-1 SD (-0.813)	0.317	0.039	8.13	0.000	0.241	0.394
Mean (0)	0.231	0.028	8.14	0.000	0.175	0.287
+1 SD (0.813)	0.144	0.043	3.39	0.001	0.061	0.228

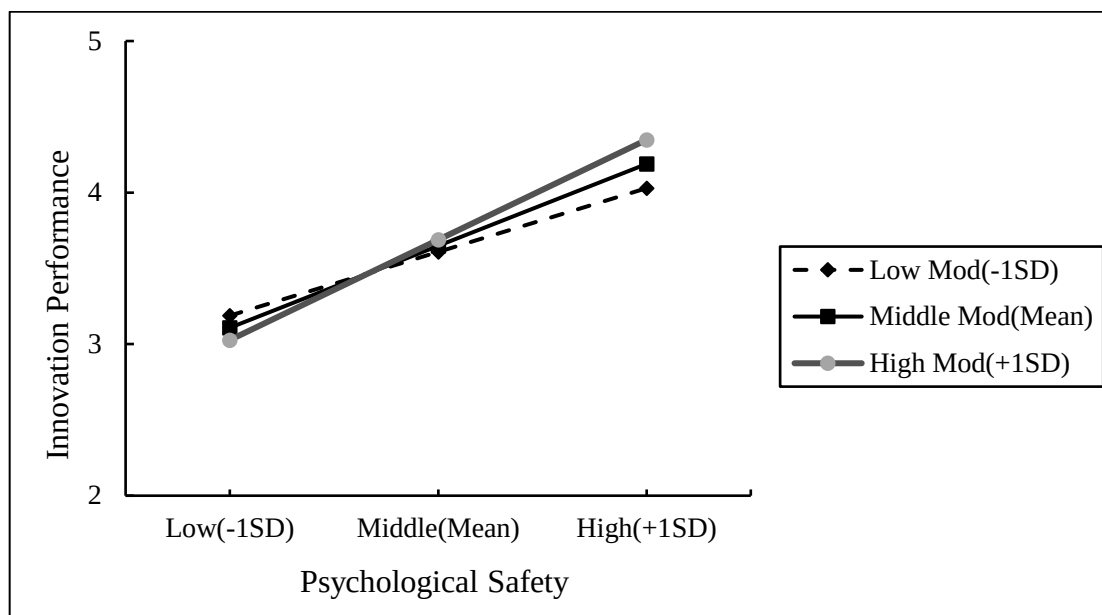


Figure 3 Simple slope analysis of the moderating effect

Conclusion

This study explores the impact of employees' silence behavior on individual innovation performance and introduces psychological safety as a mediating variable and self-efficacy as a moderating variable. Based on the structural equation model analysis of 419 valid samples, the following main conclusions are obtained.

First, employees' silence behaviors significantly negatively impact innovation performance, indicating that concealing opinions and suggestions weakens their creativity and innovative outcomes. Second, psychological safety serves as a partial mediator between silence behavior and innovation performance. Specifically, silence suppresses innovation by diminishing employees' confidence in expressing opinions and taking risks. Third, self-efficacy demonstrates a significant moderating effect between psychological safety and innovation performance. Employees with high self-efficacy exhibit lower dependence on psychological safety, while those with low self-efficacy rely more heavily on a psychologically safe environment to achieve innovation performance.

Overall, this study holds significant theoretical and practical implications. Theoretically, it reveals the psychological mechanisms and boundary conditions through which silence behaviors influence innovation performance, thereby enriching research in organizational behavior and innovation management. Practically, the findings suggest that enterprises should reduce employee silence behaviors, foster a psychologically safe environment, and enhance self-efficacy among staff to comprehensively stimulate innovation performance.

Discussion

The findings confirm that employee silence significantly reduces innovation performance. The strong negative coefficient ($\beta = -0.469$) suggests that withholding communication reduces creative behavior, consistent with social exchange theory, which highlights how silence erodes trust and limits knowledge sharing.

The positive association between psychological safety and innovation performance ($\beta = 0.417$) supports social cognitive theory, indicating that a safe climate encourages employees to take creative risks. The mediation analysis further demonstrates that psychological safety explains 19% of the total effect of silence on innovation performance, showing that while safety matters, other mediators such as communication climate or leadership trust may also play roles.

The moderating effect of self-efficacy adds another layer of insight. Results show that employees with high self-efficacy rely less on psychological safety and more on internal motivation, aligning with Bandura's self-efficacy theory. The declining slope values (from $\beta = 0.317$ at low self-efficacy to $\beta = 0.144$ at high self-efficacy) illustrate a psychological compensation effect, where internal belief partially substitutes for external support.

From a managerial perspective, these results imply that organizations should reduce silence behaviors and enhance psychological safety to improve innovation performance. At the same time, training and empowerment programs to build self-efficacy can help employees sustain innovation even in less supportive environments.

Suggestions

This study provides several managerial implications that can be further strengthened by grounding them in organizational theories and linking them to broader management frameworks. First, creating an open communication atmosphere is essential to reduce employee silence. From the perspective of social exchange theory, reciprocal trust is fostered when employees perceive that management values their input, which in turn encourages knowledge sharing and innovative behavior. Similarly, cultivating psychological safety, as proposed by Edmondson, is a necessary precondition for voice behavior and collaborative problem-solving. Managers can achieve this by reframing mistakes as learning opportunities, recognizing contributions, and establishing safe feedback channels. Moreover, drawing on Bandura's social cognitive theory, enhancing employees' self-efficacy through training, mentoring, and empowerment not only increases confidence in taking risks but also compensates for insufficient external support, ensuring that innovation can be sustained even under uncertain conditions.



Beyond individual-level interventions, systemic integration of human resource practices with innovation goals is critical. According to the knowledge-based view, innovation arises from the effective management of knowledge assets, which includes designing recruitment, appraisal, and reward systems that prioritize openness and experimentation. By embedding innovation indicators into performance evaluation and promotion criteria, organizations can institutionalize creativity and reinforce employees' motivation to share ideas. Furthermore, connecting these practices to transformational leadership and learning organization theory highlights how leadership behavior and organizational culture shape both silence and innovation outcomes. Transparent communication and organizational justice are especially important in fostering trust and psychological safety, thereby reducing silence.

In addition, a broader international and cross-industry perspective should be considered. Comparative studies across cultural contexts may reveal how dimensions such as power distance or uncertainty avoidance, as explained in Hofstede's cultural framework, influence employees' willingness to speak. For instance, in high power-distance settings, employees may remain silent out of deference to authority, requiring leaders to be more proactive in encouraging voice. Similarly, cross-industry differences suggest that hierarchical organizations must focus on dismantling structural barriers, while creative industries should prioritize collaboration and knowledge sharing. In modern contexts, digital transformation also provides new opportunities. The implementation of online feedback systems, digital collaboration platforms, and mechanisms for digital psychological safety in remote or hybrid teams can further mitigate silence and enhance innovation.

Finally, these practical recommendations point to several avenues for future research. Longitudinal and experimental designs would be valuable for testing the causal mechanisms identified here, while cross-national and cross-industry comparisons could extend the generalizability of findings. Moreover, examining emerging trends such as remote work, virtual teamwork, and AI-enabled communication systems can reveal how new work environments shape silence and innovation dynamics. By linking theoretical frameworks with actionable strategies, this study contributes both to the scholarly understanding of silence-innovation mechanisms and to managerial practices that promote a culture of openness, trust, and continuous innovation.

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