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DRIVING INNOVATION IN CHINA'S RENEWABLE ENERGY SECTOR: A DUAL-MEDIATION MODEL OF PLATFORM LEADERSHIP AND NEW-GENERATION EMPLOYEE BEHAVIOR

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Abstract

Against the backdrop of China's strategic transition toward carbon neutrality, this study investigates the mechanism linking platform leadership to the innovative behavior of new-generation employees within Yunnan's renewable energy sector. Grounded in Social Cognitive Theory, the research employs a robust sequential explanatory mixed-methods design. Quantitative data from 564 valid leader-follower dyads were analyzed using Structural Equation Modeling (SEM) and the PROCESS macro, establishing a dual-mediation model. The findings reveal that platform leadership exerts a significant direct positive effect on innovative behavior. Furthermore, creative self-efficacy and adaptive emotion regulation strategies serve as critical mediators in this relationship. Crucially, the organizational innovation climate functions as a positive moderator, amplifying the impact of leadership on these psychological pathways; a supportive climate significantly strengthens the indirect effect of leadership on innovation outcomes. Qualitative insights from 15 key stakeholders further validate these mechanisms. These results offer novel theoretical contributions to the cognitive-affective drivers of innovation and provide actionable strategies for energy enterprises to cultivate platform-based management, which is essential for sustaining Asia's green development goals.

Keywords: Platform Leadership, New-Generation Employees, Innovative Behavior, Dual-Mediation Model, Renewable Energy Enterprises

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Introduction

Climate change has emerged as a pressing global challenge, reshaping development priorities toward emissions reduction, energy conservation, and sustainable growth. In response, China has committed to peak carbon emissions by 2030 and achieve carbon neutrality by 2060 (State Council of the People's Republic of China, 2021). This strategic vision has accelerated the transition of China's renewable energy industry from policy-driven to innovation-led development (Groba & Cao, 2015), with technological innovation and talent development identified as key drivers (National Energy Administration, 2022). New-generation employees (aged 22-40) now constitute a growing proportion of the renewable energy workforce and play a pivotal role in technological breakthroughs (Guangming Online, 2025). However, the sector faces high rates of innovation failure due to rapid technological change, market uncertainty, and knowledge intensity (Misra, 2024). Particularly in frontier regions such as Yunnan—where innovation ecosystems remain underdeveloped—enterprises struggle with talent retention and inefficient allocation of innovation resources (Sun et al., 2025; Li & Yan, 2018).

While physical infrastructure and R&D investment are critical, intrinsic motivation and sustained engagement among new-generation employees are decisive for the success of innovation (Sarpong et al., 2023). However, high turnover among this cohort undermines the continuity of innovation, underscoring the limitations of traditional leadership models (Zhang et al., 2024). In this context, platform leadership—characterized by openness, empowerment, and collaboration—has shown potential in fostering innovation by building resource-sharing environments (Zhou et al., 2024; Min et al., 2024). However, its applicability in physical, policy-sensitive industries such as renewable energy remains underexplored, particularly in underdeveloped innovation ecosystems.

Despite the growing interest in platform leadership, several key research gaps persist. First, existing studies have focused mainly on internet-based or service-oriented industries, with limited empirical investigation of platform leadership in high-tech, resource-intensive sectors such as renewable energy. Second, few studies have examined how platform leadership influences innovation behavior among *new-generation employees*, a workforce segment increasingly central to R&D output but often overlooked in leadership research. Third, although individual psychological mechanisms—such as creative self-efficacy and emotion regulation—are known to affect innovation behavior, prior research has rarely integrated these cognitive and affective pathways into a unified framework to explain how leadership influences innovation. Finally, the moderating role of *organizational innovation climate* in shaping the effectiveness of platform leadership remains insufficiently addressed, particularly in regional contexts where innovation environments vary significantly.

Drawing on social cognitive theory (Bandura, 1991), this study develops a dual-mediation model to examine how platform leadership influences the innovative behavior of new-generation employees through cognitive (creative self-efficacy) and affective (emotion regulation strategies) mechanisms. It also investigates the moderating role of organizational innovation climate, which may enhance or diminish the impact of leadership on psychological mechanisms (Ozsoy, 2022). Addressing these gaps offers theoretical and practical insights into how to stimulate innovation from the microfoundations of employee behavior in China's renewable energy transformation.

In summary, this study focuses on renewable energy enterprises in Yunnan Province, China, addressing the following questions: 1) How does platform leadership influence the innovation behavior of new-generation employees in Yunnan's renewable energy sector? 2) Do creative self-efficacy and emotional regulation strategies mediate this relationship? 3) Does organizational innovation climate moderate the impact of platform leadership on new-generation employees' innovation behavior through dual mediation mechanisms?

Through this analysis, the study reveals the critical value of leadership transformation in addressing innovation challenges within Yunnan's renewable energy enterprises. The findings not only provide theoretical foundations for regional renewable energy firms to foster employee innovation through leadership transformation but also enrich the practical significance of leadership and innovation research in Asia.

Literature Review and Hypotheses Development

Platform Leadership and New-Generation Employees' Innovative Behavior

Innovative behavior among new-generation employees (aged 22-40) refers to their proactive generation and application of creative ideas to enhance technologies, processes, or services (Yang et al., 2016). This behavior comprises five dimensions: idea generation, promotion, realization, knowledge sharing and collaboration, and risk-taking with learning from failure (Kremer et al., 2019), all of which improve both individual and organizational performance. Platform leadership, as defined by Zhou et al. (2024), emphasizes shared goals, mutual growth, and expanded purpose to stimulate innovation. Its six core components—charisma, inclusivity, change planning, platform building, optimization, and co-development (Leong et al., 2019)—reflect a people-centered leadership style that encourages self-actualization and lowers innovation risk.

In Yunnan's renewable energy sector, such innovative behavior extends beyond breakthrough R&D to improvements in daily operations, including process optimization and equipment efficiency. For these enterprises, fostering innovation is critical to transitioning from resource dependence to innovation-led development. According to Social Cognitive Theory (Bandura, 1991), behavior (B), personal factors (P), and environmental factors (E) interact through triadic reciprocal determinism. Within this framework, platform leadership functions as a key environmental enabler (E) of innovation, particularly in volatile technological and market environments.

Given Yunnan's challenges in talent attraction and fragmented innovation resources, platform leadership provides strategic mechanisms to drive innovation: 1) linking resources and opportunities through digital platforms and knowledge-sharing systems (Khan et al., 2025). 2) empowering and motivating employees via delegated authority, targeted training, and support—especially for local talent (Xiong et al., 2024); and 3) fostering a collaborative, failure-tolerant innovation environment that integrates individual efforts into organizational learning (Meng & Wang, 2024).

In summary, this study posits that platform leadership can directly drive the emergence of innovative behavior by systematically constructing a supportive trinity of "opportunity-capability-motivation" for new-generation employees. Based on the logic within Social Cognitive Theory, proposing a direct influence of the environment (E) on behavior (B), the following hypothesis is proposed:

Hypothesis 1: Platform leadership has a significant positive direct effect on new-generation employees' innovative behavior.

Mediating Role of Creative Self-Efficacy

Creative self-efficacy, employees' belief in their ability to generate and implement innovative ideas (Slåtten, 2014), is essential for new-generation employees in Yunnan's renewable energy sector, where innovation demands are high, but talent and resources are limited. Platform leadership, characterized by empowerment, openness, and knowledge sharing, can enhance creative self-efficacy by providing mastery experiences, vicarious learning opportunities, and verbal encouragement, aligning with the four efficacy sources in Social Cognitive Theory (Bandura, 1991; Lee et al., 2010; Leong et al., 2019). Employees who gain confidence through successful innovation tasks, observe peer success, and receive supportive feedback are more likely to sustain innovative efforts. In turn, high creative self-efficacy motivates employees to

approach challenges proactively, set ambitious goals, and creatively leverage limited resources—key drivers of innovative behavior under regional constraints (Puentes-Díaz, 2016; Zhang et al., 2023). Thus, creative self-efficacy not only serves as a vital personal cognitive resource but also mediates the relationship between platform leadership and innovative behavior, thereby supporting hypotheses 2, 3, and 4.

Mediating Role of Emotion Regulation Strategies

Emotion regulation strategies—such as cognitive reappraisal and expressive suppression—enable individuals to manage emotional responses during innovation (Brockman et al., 2017), which is particularly crucial for new-generation employees in Yunnan's resource-constrained renewable energy sector. Grounded in Social Cognitive Theory, platform leadership enhances adaptive emotion regulation by offering vicarious experiences, constructive feedback, and psychological safety (Ng & Lucianetti, 2016; Jianlin et al., 2024; Yuyi et al., 2025). These mechanisms reduce anxiety and promote reappraisal over suppression, helping employees reframe innovation risks as growth opportunities. Emotion regulation, in turn, strengthens psychological safety, supports social exchange, and sustains motivation under pressure for innovation (Marini et al., 2025; Roberts-Olatawura, 2025). Thus, adaptive emotion regulation strategies not only directly foster innovative behavior but also mediate the relationship between platform leadership and innovation outcomes, supporting hypotheses 5, 6, and 7.

Moderating Role of Organizational Innovation Climate in the Psychological Mechanisms Linking Platform Leadership to Innovative Behavior

Organizational innovation climate plays a critical moderating role in enhancing the effects of platform leadership on both creative self-efficacy and emotion regulation strategies. A supportive innovation climate—characterized by resource availability, failure tolerance, and psychological safety—amplifies the credibility and effectiveness of platform leaders' empowering behaviors, reinforcing employees' belief in their innovative abilities through mechanisms such as social persuasion, situational reinforcement, and vicarious learning (Hutchison-Krupat & Chao, 2013; Supriyanto et al., 2023). Similarly, such climates strengthen employees' adoption of adaptive emotion regulation strategies, like cognitive reappraisal, by aligning organizational norms with leaders' emotional support practices (Edmondson & Bransby, 2023; Carmeli & Gittell, 2009). Conversely, in weak innovation climates, these leadership efforts are often undermined by a lack of institutional support and emotional safety (Ejimabo, 2015; Ashkanasy et al., 2017). Drawing on Social Cognitive Theory, this study posits that organizational innovation climate positively moderates both the direct effects of platform leadership on creative self-efficacy and emotion regulation strategies, and the mediating roles of these constructs in driving new-generation employees' innovative behavior (hypotheses 8-11).

Conceptual Framework

The research on the impact of platform-based leadership on the innovative behaviour of the new generation of employees in the renewable energy industry in Yunnan Province, China, is presented in the conceptual framework shown in Figure 1.

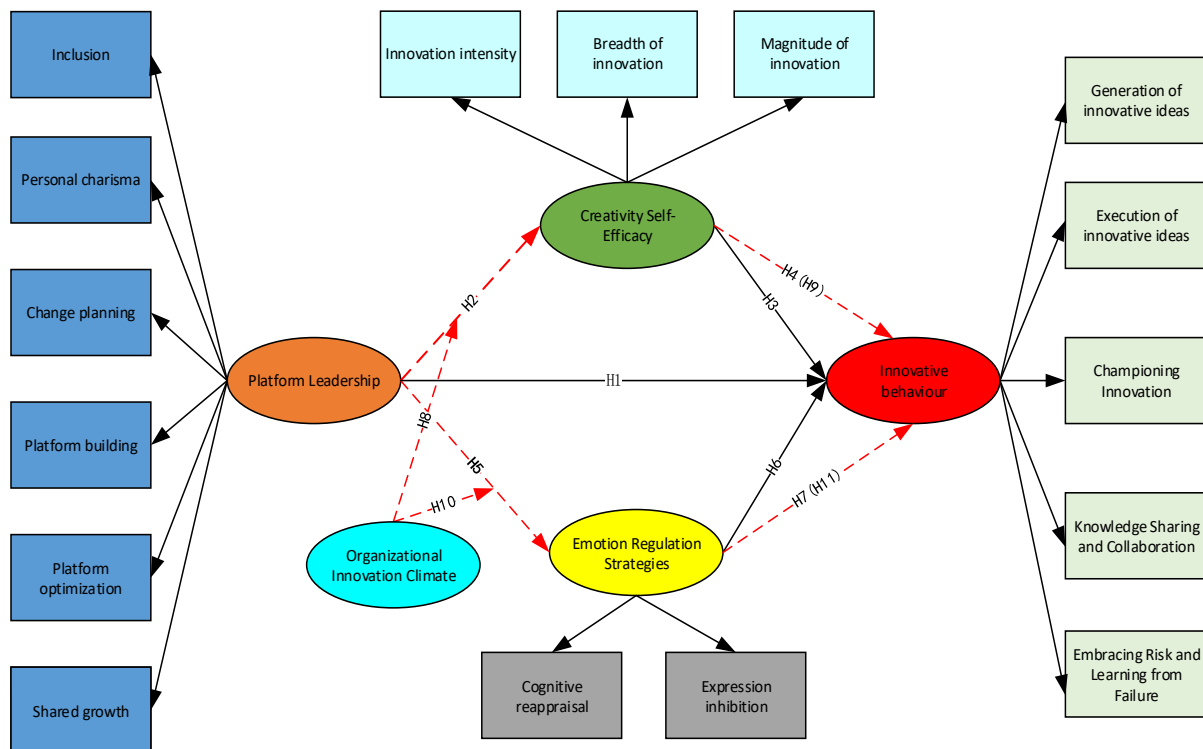


Figure 1 Research Conceptual Framework

Research Method

The researcher designed the research by formulating the mixed research method using the descriptive pattern in sequence (Dividing the research into 2 phases, helping to answer research questions clearly, rather than using a single quantitative or qualitative research model (Creswell & Clark, 2018)).

Phase 1: Quantitative Research

A structured questionnaire survey was administered to leaders and employees of state-owned, private, and foreign-invested enterprises, as well as research institutions, within Yunnan's renewable energy sector. A matched-samples, three-wave design was adopted, with surveys administered at 15-day intervals to mitigate common-method bias and enhance temporal validity. The study employed multi-stage random sampling to ensure sample representativeness. After eliminating incomplete or inconsistent responses, 564 valid questionnaires were retained, achieving an effective response rate of 82.45%, which exceeds the minimum threshold recommended for large-scale organizational studies (Hair et al., 2019). All study variables were measured using well-established and validated scales. The questionnaire items were reviewed by five experts to assess item-objective congruence (IOC) and refined through a translation-back-translation process to ensure linguistic accuracy and cultural relevance for the Chinese context. All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Innovative behavior was measured using the five-item scale developed by Kleysen & Street (2001), which demonstrated high reliability ($\alpha = 0.952$). Platform leadership was assessed through six items adapted from Hao et al. (2021) ($\alpha = 0.973$), while creative self-efficacy employed six items from Tierney & Farmer (2002) ($\alpha = 0.965$). Emotion regulation strategies were measured using four items from Gross (1998) ($\alpha = 0.889$), and organizational innovation climate was assessed using five items from Popa et al. (2017) ($\alpha = 0.899$).

All constructs exhibited Cronbach's alpha coefficients exceeding the 0.70 benchmark, indicating high internal consistency and reliability and supporting subsequent structural equation modeling (SEM) analysis.

Phase 2: Qualitative Research

To complement the quantitative findings, in-depth interviews were conducted with 15 purposively selected key informants: five business leaders, five new-generation employees, and five industry experts. Participants met predefined criteria related to innovation roles, policy involvement, and academic contributions. Triangulation (Miles et al., 2018) ensured the credibility of the data. Thematic insights were integrated with quantitative results to inform the final analysis.

Research Results

Reliability and Convergent Validity Tests Testing

This research examined the reliability and convergent validity of the measurement scales for the five core constructs in the theoretical model using AMOS and SPSS. All standardized factor loadings were statistically significant and exceeded 0.5, with most approaching or surpassing 0.7. Cronbach's alpha coefficients ranged from 0.889 to 0.973, indicating strong internal consistency. Composite reliability (CR) values exceeded 0.8, and average variance extracted (AVE) values exceeded 0.5, indicating satisfactory reliability and convergent validity.

Confirmatory Factor Analysis

This research conducted confirmatory factor analysis on key variables using AMOS to test the model's discriminant validity. The analysis results indicated that the five-factor model provided the best fit. The X^2/df ratio was 2.995, less than 3; the GFI was 0.993, greater than 0.9; the NFI was 0.979, greater than 0.9; the CFI was 0.996, greater than 0.9; the RMSEA was 0.076, less than 0.1; the SRMR was 0.0693, less than 0.08. The excellent performance of these indicators fully demonstrates that the discriminant validity among the variables in the theoretical model developed in this research is significant and that the model fits well. The relevant results are shown in Table 1.

Table 1 Results of Confirmatory Factor Analysis

Modelling	X^2/df	GFI	NFI	CFI	RMSEA	SRMR
Single Factor Model (PL + CSE + ERS + EIB + OI;)	8.616	0.742	0.736	0.720	0.146	0.1824
Two-factor model (PL; CSE + ERS + EIB; OI;)	6.852	0.652	0.651	0.711	0.188	0.1165
Three-Factor Model (PL + CSE + E; EIB; OI;)	5.156	0.774	0.836	0.714	0.143	0.0998
Four-Factor Model (PL; CSE + ERS; EIB; OI;)	4.815	0.791	0.899	0.816	0.101	0.0974
Five-Factor Model (PL; CSE; ERS; EIB; OI;)	2.995	0.993	0.979	0.996	0.076	0.0693

Note: sample size = 564; '+' indicates that several factors are combined into a single factor. PL = Platform leadership; CSE = Creativity Self-Efficacy; ERS = Emotion Regulation Strategies; EIB = Employee Innovative Behaviour; OI = Organizational Innovation Climate

Correlation Analysis among Key Variables

The correlation matrix showed strong, significant positive relationships among key variables, supporting the hypothesized model. Platform leadership was strongly correlated with creative self-efficacy ($r = 0.717$), organizational innovation climate ($r = 0.756$), emotion regulation strategies ($r = 0.530$), and innovative behavior ($r = 0.651$). Creative self-efficacy strongly correlated with innovative behavior ($r = 0.811$), organizational innovation climate ($r = 0.762$), and emotion regulation ($r = 0.591$). Emotion regulation was positively linked to innovative behavior ($r = 0.686$) and organizational innovation climate ($r = 0.628$). Innovative behavior

also strongly correlated with organizational innovation climate ($r = 0.772$). Overall, the findings support the theoretical model and provide a solid base for further analysis.

Hypothesis Testing

This study employed hierarchical regression analysis combined with the Bootstrap method available in the PROCESS macro developed by Hayes (2015) to test the proposed hypotheses. This analytical procedure uses bootstrapping to examine mediation and moderation models, as well as their combinations (e.g., moderated mediation and mediated moderation). The methodology has gained widespread application and substantial recognition across management and related research disciplines.

1) Main effect test: As shown in Table 2 (Model 6), platform leadership exerts a significant direct positive influence on the innovative behavior of new-generation employees ($\beta = 0.602$, $**p < 0.01$). After controlling for other variables, platform leadership accounts for 41.8% of the variance in employees' innovative behavior. This indicates that platform leadership directly motivates new-generation employees to exhibit innovative behavior, thereby supporting H1.

To test the mediating effects, hierarchical regression and bootstrapping (5,000 resamples) were employed. Platform leadership significantly predicted creative self-efficacy ($\beta = 0.672$, $p < 0.01$) and emotion regulation strategies ($\beta = 0.514$, $p < 0.01$), both of which significantly influenced innovative behavior among new-generation employees ($\beta = 0.698$ and $\beta = 0.471$, respectively; both $p < 0.001$), supporting H2-H3 and H4-H5. Mediation analysis confirmed that creative self-efficacy mediated the relationship between platform leadership and innovative behavior (indirect effect = 0.391, 95% CI [0.304, 0.479], 43.37% of total effect), while emotion regulation strategies also showed a significant mediating effect (indirect effect = 0.154, 95% CI [0.099, 0.220], 34.96% of total effect), thus supporting H4 and H6.

Table 2 Mediating Effect Analysis

Form	Pathway	Effect	SE	T	P	LLCI (95%)	ULCI (95%)	Efficacy as a percentage
Total effect		0.617	0.041	15.044		0.536	0.698	100%
Direct effects	PL→EIB	0.072	0.041	1.741	0.083	0.009	0.154	21.67%
Indirect effect	PL→CSE→EIB	0.391	0.044			0.304	0.479	43.37%
	PL→ERS→EIB	0.154	0.031			0.099	0.220	34.96%

Note: PL = Platform leadership; CSE = Creativity Self-Efficacy; ERS = Emotion Regulation Strategies; EIB = Employee Innovative Behaviour; OI = Organizational Innovation Climate

2) Test of the Moderating Effects of Organizational Innovation Climate: To examine moderating effects, platform leadership and organizational innovation climate were mean-centered, and interaction terms were tested using regression analysis. Results (Table 2, Model 2) showed that organizational innovation climate significantly moderated the positive effect of platform leadership on creative self-efficacy ($\beta = 0.162$, $p < 0.01$), with simple slope analysis confirming a stronger relationship under high climate conditions, supporting H8. Similarly, Model 4 indicated a significant moderating effect on emotion regulation strategies ($\beta = 0.223$, $p < 0.001$), with platform leadership's impact being more substantial when organizational innovation climate was high, supporting H10. These findings suggest that a supportive innovation climate enhances the positive influence of platform leadership on both psychological mechanisms.

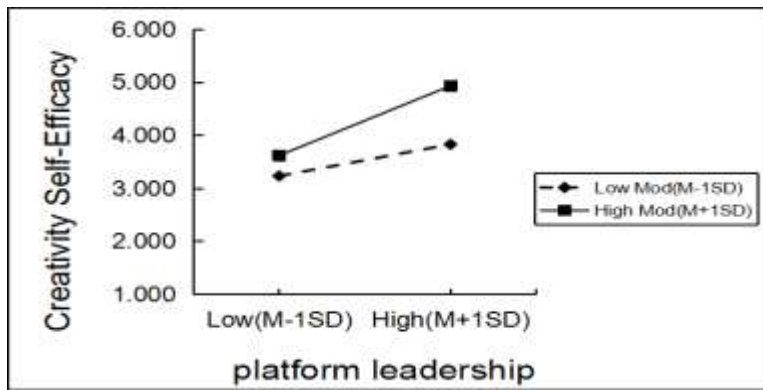


Figure 2 Moderating Role of Organizational Innovation Climate Between Platform Leadership and Creativity Self-Efficacy

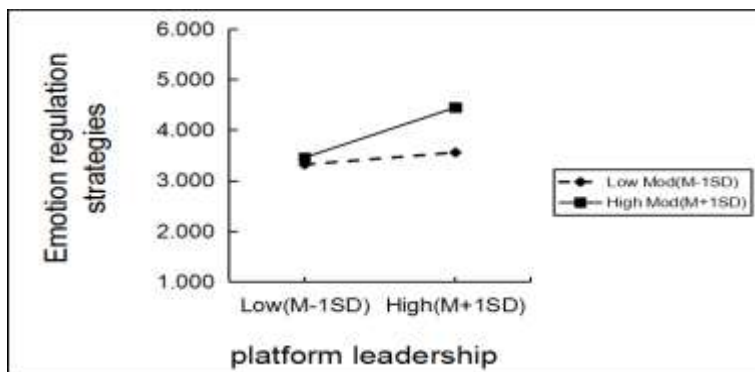


Figure 3 Moderating Role of Organizational Innovation Climate Between Platform Leadership and Emotional Regulation Strategies

3) Test of the Moderated Mediation Effects: To test moderated mediation effects, Model 7 of the SPSS PROCESS macro (Hayes, 2015) was used. Results showed that the indirect effect of platform leadership on new-generation employees' innovative behavior via creative self-efficacy was significant under a high organizational innovation climate ($\beta = 0.076$, 95% CI = [0.247, 0.441]) but not under a low climate (CI included zero), supporting H9. Similarly, the indirect effect via emotion regulation strategies was significant only under high organizational innovation climate ($\beta = 0.150$, 95% CI = [0.024, 0.277]), confirming H11. These findings indicate that organizational innovation climate positively moderates both mediating pathways, strengthening the impact of platform leadership on innovative behavior.

Table 3 Moderated Mediation Effect

Mediation effect path	Organizational Innovation Climate	Effect	BootSE	95% confidence interval	
				BootLLCI	BootULCI
Creativity Self-Efficacy	Low (M – 1SD)	0.100	0.064	-0.025	0.441
	High (M + 1SD)	0.076	0.049	0.247	0.441
Emotion Regulation Strategies	Low (M – 1SD)	0.079	0.083	-0.243	0.085
	High (M + 1SD)	0.150	0.640	0.024	0.277

The study confirmed all eleven hypotheses. Platform leadership demonstrated a significant positive direct effect on the innovative behavior of new-generation employees (H1), and significantly influenced both creative self-efficacy (H2) and adaptive emotion regulation strategies (H5). Creative self-efficacy and adaptive emotion regulation strategies were positively associated with innovative behavior (H3, H6), and both served as significant mediators in the relationship between platform leadership and innovative behavior (H4, H7).

Furthermore, the organizational innovation climate positively moderated the relationships between platform leadership and creative self-efficacy (H8) and adaptive emotion regulation strategies (H10). It also strengthened the mediating roles of creative self-efficacy and emotion regulation strategies (H9, H11). These findings highlight the critical role of leadership, emotional and cognitive mechanisms, and organizational context in fostering innovation among new-generation employees.

Qualitative Research Results

Findings from the qualitative phase reinforced the statistical validity of all hypothesized relationships. Business leaders emphasized the importance of platform leadership in fostering a culture of innovation, providing concrete examples of empowerment practices, resource allocation, and tolerance for failure, supporting H1, H2, and H5. New-generation employees described increased creative confidence and emotional resilience as direct outcomes of their leaders' encouragement and collaborative platforms, validating the mediating roles proposed in H4 and H7. Industry experts highlighted that a strong organizational innovation climate amplifies these effects, particularly in resource-limited contexts such as Yunnan, thereby supporting H8-H11. The interviews also revealed how cognitive mechanisms (e.g., self-efficacy) and affective processes (e.g., emotion regulation) are shaped by leadership behaviors and organizational norms, aligning with the core logic of Social Cognitive Theory. The integration of these qualitative insights with the quantitative data provided robust, multi-level support for all eleven hypotheses.

Conclusion and Discussion

This mixed-methods study demonstrates that platform leadership significantly drives innovative behavior among new-generation employees in Yunnan's renewable energy sector through two psychological mechanisms—creative self-efficacy and emotion regulation strategies—moderated by the organizational innovation climate. The integrated model establishes both the statistical relationships using quantitative data and the underlying mechanisms through qualitative insights, with strong convergence between the methods. Specifically, platform leadership exerts a significant direct influence on the innovative behavior of the new generation of employees, consistent with the enabling co-creation model, which establishes structural and relational conditions conducive to innovation.

The findings confirm that platform leadership operates through cognitive-affective pathways while being critically contingent on organizational contextual support. Creative self-efficacy serves as the primary mediating mechanism, aligning with Bandura's (1991) social cognitive theory, whereby leadership enhances efficacy beliefs through experiential learning and feedback. Furthermore, emotion regulation strategies function as a secondary mediator, as supported by Gross's (1998) framework, indicating that leadership facilitates cognitive reappraisal amid innovation-related uncertainties. Crucially, the organizational innovation climate significantly moderates these pathways. The indirect effect via creative self-efficacy is salient only under a strong innovation climate. At the same time, the mediating role of emotion regulation is amplified in such contexts, corroborating Ozsoy's (2022) conceptualization and highlighting the synergy between leadership practices and organizational support.

In summary, platform-based leadership not only directly promotes innovation but also generates more substantial catalytic effects by enhancing employees' belief in their own creativity and their ability to cope with innovation-related emotional stress. This directly helps enterprises build more sustainable and adaptive development models. The research contributes to the leadership and innovation literature by elucidating the synergistic effects of leadership style, psychological processes, and the organizational environment on sustainable energy transitions. Methodologically, the sequential explanatory design provides both generalizable patterns and contextualized understanding, enhancing theoretical depth and ecological validity.

These findings offer significant insights for interdisciplinary theoretical discourse and for regional sustainable development practices in Asia, while contributing unique “Asian wisdom” and practical regional experience to the global climate change response. The research findings align strongly with and provide robust support for multiple United Nations Sustainable Development Goals (SDGs), specifically: Strengthening renewable energy innovation capabilities supports SDG 7 (Affordable and Clean Energy); promoting continuous innovation through empowering, inclusive, and mentally healthy work environments advances SDG 8 (Decent Work and Economic Growth); and elucidating the microfoundations of strategic industrial innovation advances SDG 9 (Industry, Innovation and Infrastructure).

To translate these insights into practice, enterprises should incorporate evidence-based approaches—including platform leadership, psychological mechanisms (creative self-efficacy and emotional regulation), and organizational innovation climate—into renewable energy talent policies. Specific measures include developing leadership development programs that emphasize empowerment and inclusion, and establishing psychological support systems to enhance young employees' resilience to innovation-related stressors. This will accelerate the regional green transformation and achieve carbon-neutrality goals. Concurrently, enterprises should adopt mature mechanism models to cultivate platform leadership through cross-functional collaboration networks, experimental recognition systems, and error-tolerant environments. Leveraging reward structures and value internalization to reinforce innovation culture amplifies leadership's impact on psychological mediators and sustainable innovation outcomes, enhancing organizational adaptability in Asia's and the world's low-carbon transition.

While this study offers valuable contributions, it also presents avenues for future research. The study primarily collected qualitative data through in-depth interviews with 15 stakeholders. While this approach yielded valuable insights, future research could employ a more diverse set of qualitative methods to capture richer perspectives. For instance, focus group discussions with cross-functional teams (e.g., R&D and management personnel) could reveal operational patterns of platform leadership in collaborative settings, and participatory observation of innovation projects could provide real-time insights into the interactive mechanisms between emotional regulation and creative problem-solving. These approaches would complement existing findings by uncovering dynamic, context-dependent mechanisms. Furthermore, while this study employs a sequential interpretive mixed-methods design, future research may reverse this design, using qualitative studies to drive hypothesis generation. For instance, grounded theory could explore innovation dynamics in understudied areas or subfields of renewable energy, thereby identifying novel constructs (e.g., how specific technologies hinder self-efficacy) to enhance the model's explanatory power. Additionally, longitudinal studies tracking temporal changes in platform leadership, psychological mediators, and innovation behaviors could establish causal time-series relationships, thereby overcoming current cross-sectional limitations and deepening understanding of long-term innovation drivers.

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