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The Impact Of Transformational Leadership In Higher Education On Employee Innovative Behavior Through Organizational Climate

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Abstract

This study explores the impact of leadership styles in higher education on innovation climate and employee innovative behavior, specifically in the context of universities in Guizhou, China. The central hypothesis is that transformational leadership significantly promotes an innovation-conducive atmosphere and bolsters innovative behaviors among university staff. Participants included 360 faculty and staff members from various universities across Guiyang, Zunyi, Anshun, and other regions in Guizhou, selected for their direct involvement with institutional leadership and innovation activities. Utilizing an observational study design, the research employed a questionnaire survey to collect data, with a focus on assessing perceptions of leadership styles, innovation climate, and innovative behavior. This method ensured a comprehensive analysis of the interplay between these variables. Primary data from the surveys were complemented by a secondary analysis of existing literature on leadership in higher education. The findings indicate a positive relationship between transformational leadership styles and innovation climate, with substantial effect sizes and statistical significance. Furthermore, these leadership styles were significantly correlated with enhanced innovative behavior among employees, as evidenced by confidence intervals and statistical significance levels. The study concludes that in the context of Guizhou's universities, transformational leadership is a key driver in fostering a conducive environment for innovation and stimulating innovative behaviors in staff. These insights underscore the pivotal role of leadership in shaping the organizational culture and innovation dynamics in higher education, providing valuable implications for educational administrators and policymakers focused on augmenting the innovative capacities of their institutions.

Keywords: *transformational leadership, innovation climate, employee innovative behavior, organizational culture, higher education management.*

Introduction

The higher education landscape in Guizhou Province is undergoing a significant transformation, mar[1]ked by rapid development and an increasing role in driving regional economic and societal progress. In the midst of this evolution, the higher education sector faces the challenge of adapting to the global trends of technological advancement and

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globalization. The traditional focus on knowledge impartation in universities is now shifting towards a greater emphasis on innovation, reflecting the changing demands of the modern educational and economic environment (Aboobaker & Zakkariya, 2021; Lin, Beh & Kamil, 2023). This change in basic assumptions underscores the critical importance of fostering innovative capabilities within university faculty and staff, recognized as key contributors to enhancing the competitiveness and relevance of higher education institutions in this new era (Madi Odeh et al., 2023).

Central to this emerging focus on innovation is the role of leadership within universities. Leadership styles, particularly those characterized by personalized care, vision shaping, motivation, and exemplary conduct, are increasingly seen as vital in nurturing an environment conducive to innovation (Zhu & Wang, 2018).These leadership approaches are believed to not only influence the immediate behaviors and attitudes of faculty and staff but also to shape the broader organizational culture and innovation climate within educational institutions (Sinha, Priyadarshi & Kumar, 2016).. However, the specific nature and dynamics of this influence remain an area ripe for exploration, particularly in understanding how different leadership styles can effectively stimulate and sustain innovative behaviors in the context of higher education (Zhang & Bao, 2019).

The backdrop of Guizhou's rapidly developing higher education sector provides a unique context to explore these dynamics. The interplay between leadership styles, organizational culture, and the resulting innovation climate in universities presents both practical challenges and theoretical opportunities for understanding how to best cultivate innovation in higher education. This exploration is crucial for aligning university practices with the evolving demands of the global educational landscape and for positioning these institutions as key players in regional and societal advancement.

Literature Review

In the realm of higher education, the impact of leadership on fostering an environment conducive to innovation has been a topic of considerable interest in recent scholarship. Previous work has predominantly focused on how various leadership styles, particularly transformational leadership, influence innovative behavior among faculty and staff in universities (Huey Yiing & Zaman Bin Ahmad, 2009).These studies have consistently highlighted the positive correlation between transformational leadership traits—such as inspirational motivation, intellectual stimulation, and individualized consideration—and the enhancement of innovative behaviors (Ma & Jiang, 2018).

Additionally, the role of organizational culture as a mediator in the relationship between leadership styles and innovation has been explored, with researchers underscoring how an organization's culture can significantly impact employees' attitudes and behaviors towards innovation (Alkhadra, Khawaldeh & Aldehayyat, 2023; Ullah, Mirza & Jamil, 2021).This body of work suggests that a supportive and empowering organizational culture, shaped by effective leadership, can facilitate innovative thinking and actions among university staff.

However, while these studies provide valuable insights, there remains a gap in the literature concerning the specific context of rapidly developing higher education systems, such as those in Guizhou Province. Earlier reports have primarily focused on more established educational systems, often in Western contexts. The current study diverges from these earlier reports by situating the investigation within the unique socio-economic and cultural context of Guizhou’s higher education institutions. This shift in focus is crucial, as it considers the unique challenges and opportunities that arise in a rapidly evolving educational landscape, which may influence how leadership styles and organizational culture interact to foster innovation. By addressing this gap, the current study aims to contribute a more nuanced understanding of the dynamics between leadership, organizational culture, and innovation in a context that has been less explored in existing literature.

When it comes to transformational leadership, researchers unanimously acknowledge its pivotal role in shaping employee innovative behavior (Al Harbi, Alarifi &

Mosbah, 2019). Widely studied in the university setting, transformational leadership emphasizes how leaders foster innovation and development within an organization by inspiring positive emotions, unlocking potentials, and providing personalized care to faculty and staff (Wang, Meng & Cai, 2019). Transformational leadership is understood as a leadership style capable of stimulating employees' innovative consciousness and behavior . Studies indicate that the four dimensions of transformational leadership—personalized care, vision shaping, motivation, and exemplary conduct—demonstrate significant positive correlations with employee innovative behavior . For instance, personalized care establishes trust among employees, stimulating them to exhibit more innovative thinking (Wang et al., 2021).

Moreover, leaders' vision shaping has been proven to inspire employees to actively explore new ideas and methods (Iddris et al., 2023; Uzkurt et al., 2013) Effective implementation of transformational leadership in universities is considered one of the key factors in shaping an innovative atmosphere and enhancing faculty and staff's innovative behavior (Zhang & Bao, 2019). Its positive impacts are primarily manifested in encouraging employees to engage in new projects, fostering greater creativity and innovation, and promoting teamwork and communication (Zhang & Zhao, 2023; Yang & Liu, 2021).Therefore, in-depth research into how transformational leadership styles influence the innovative behavior of university faculty and staff, as well as their underlying mechanisms, is crucial for university management and development.

In universities, organizational culture is considered an important mediating variable affecting employee innovative behavior. Its role lies in moderating the relationship between leadership styles and the innovative behavior of faculty and staff (Tran, 2023) Organizational culture refers to the degree to which employees perceive the organization providing them with support, care, and encouragement, which significantly influences their work attitudes and behaviors (Tran, 2023)Research indicates that organizational culture plays a mediating role between transformational leadership and its various dimensions and employee innovative behavior (Ekmekcioglu & Öner, 2023). For example, when leaders demonstrate personalized care and visionary motivation, this perception tends to incline employees towards displaying innovative behavior . Additionally, organizational culture can also foster the development of employees' innovative consciousness and capabilities, thereby promoting the generation of innovative behavior (Nazir et al., 2021).

In the university environment, establishing organizational culture is crucial in shaping a positive innovative atmosphere . This supportive environment can enhance employees' confidence and job satisfaction, encouraging them to attempt new innovative methods and ways of thinking (Aboobaker & Zakkariya, 2021; Chin, 2013). By creating a work environment full of trust and support, organizations can stimulate employees' innovative potential, propelling the vigorous development of innovative behavior in universities. Overall, organizational culture plays a crucial role in promoting the innovative behavior of faculty and staff in the university environment.

The innovative atmosphere, regarded as a crucial moderating variable, significantly influences the relationship between leadership style and employee innovative behavior. It refers to the organizational working environment and culture that fosters free thinking, encourages experimentation with new methods, and embraces failure as a learning opportunity (Dung & Giang, 2022). Research indicates that the presence of an innovative atmosphere is crucial for mediating the effects between transformational leadership and employee innovative behavior.

When an environment encourages innovation and supports exploratory behavior, the positive impact of transformational leadership becomes more pronounced (Alblooshi, Shamsuzzaman, & Haridy, 2021). The existence of an innovative atmosphere can stimulate employees' drive for innovation, making them more willing to explore new ideas and creativity in their work . In a university setting, establishing an innovative atmosphere requires comprehensive organizational culture support (Busaibe et al., 2017). This includes

providing resource support, encouraging teamwork, and establishing open communication channels. It also demands leadership demonstrating support and encouragement for innovation, showcasing a positive and proactive work attitude . Overall, the innovative atmosphere stands as a crucial factor in stimulating employee innovative behavior within universities.

Understanding and exploring innovative behavior within universities are crucial for enhancing their competitiveness. In this context, innovative behavior refers to the innovative consciousness, capabilities, and manifestations exhibited by faculty and staff (Anderson, De Dreu, & Nijstad, 2004). Studies emphasize that the innovative behavior of teachers and staff is a significant representation of a university's innovative capabilities, directly impacting its development and innovative competitiveness . Leadership styles play a crucial role in shaping innovative behavior within universities, especially transformational leadership, which significantly influences faculty and staff's innovative behavior (Al Harbi, Alarifi, & Mosbah, 2019). Transformational leadership emphasizes personalized care, vision shaping, motivation, and exemplary conduct to stimulate employees' innovative potential and behavior . Research indicates that these dimensions of leadership styles positively impact employee innovative behavior.

Furthermore, organizational culture serves as a crucial mediating variable between leadership style and innovative behavior. Employees with a higher sense of organizational culture support are more likely to display proactive innovative behavior, particularly when leadership styles emphasize innovation and support (Ali et al., 2021). This sense of support motivates employees to implement and execute innovative ideas, thereby significantly contributing to the formation of an innovative atmosphere and enhancing the university's innovative capabilities.

Hypothesis Formulation

When discussing the impact of transformational leadership on employee innovative behavior, existing research has provided substantial evidence indicating the significant role this leadership style plays in inspiring and fostering employee innovation. For instance, a study focused on university faculty found that transformational leadership exhibited a significant positive influence on innovative behavior within this group, emphasizing how leaders stimulate the innovative potential of subordinates and provide support and encouragement to effectively promote employee innovative behavior (Choi, Kim, Ullah, & Kang, 2016). Similarly, a survey demonstrated that transformational leadership positively influences employee innovative behavior by guiding creativity, transmitting positive energy, and setting motivational goals (Uzkurt, Kumar, Kimzan, & Eminoğlu, 2013). These studies demonstrate from various dimensions how transformational leadership encourages innovation, provides support, and sets positive goals to stimulate employee innovation. Based on this research, the first hypothesis is proposed.

H1: Transformational leadership directly influences employee innovative behavior.

Considering the impact of transformational leadership on employee innovative behavior, the potential mediating role of organizational culture in this relationship is increasingly recognized by scholars. Previous research has illuminated this mediating effect, underscoring the role of organizational culture between transformational leadership and employee innovative behavior (Ahmad, Sohal, & Wolfram Cox, 2020). These findings indicated that transformational leadership tends to foster a positive, supportive work environment, thereby enhancing employees' perceptions of organizational culture support. It was observed that organizational culture mediates the relationship between transformational leadership and employee innovative behavior, with leaders indirectly influencing employee innovation through support and resource provision.

Further supporting this notion, another study demonstrated a strong link between transformational leadership behaviors and perceived organizational culture support, significantly affecting employee innovative behavior (Hooi & Chan, 2022). These studies

collectively suggest that organizational culture can act as a mediating factor in the influence of leadership on employee innovative behavior, proposing a mechanism for how organizational culture mediates this relationship, which may differ across various cultural and organizational contexts. Based on these insights, the second hypothesis is proposed.

H2: Organizational culture mediates the relationship between transformational leadership and employee innovative behavior.

When exploring the impact of transformational leadership on employee innovative behavior, scholars are increasingly focusing on the moderating role of an innovative atmosphere in this relationship. Previous research has continuously explored the potential role of an innovative atmosphere in the relationship between transformational leadership and employee innovative behavior, providing crucial insights into this dynamic. Zhang and Bao (2019) found in their study that an innovative atmosphere significantly moderates the relationship between transformational leadership and employee innovative behavior. They emphasized the degree to which an internal innovative atmosphere influences the impact of transformational leadership on employee innovative behavior. The results indicated that when an innovative atmosphere is strong, the influence of transformational leadership on employee innovative behavior becomes more pronounced, strengthening this positive relationship. Similarly, Puni, Hilton, Mohammed, & Korankye (2022) proposed a similar conclusion in their study. Their research results indicated that the innovative atmosphere moderates the relationship between transformational leadership and employee innovative behavior mediated by organizational culture. The study highlighted how the existence of an innovative atmosphere enhances the positive impact of transformational leadership and organizational culture on employee innovative behavior, making this relationship more pronounced and positive. The innovative atmosphere may play a moderating role in the process where transformational leadership influences employee innovative behavior through organizational culture. These findings further underscore the crucial role played by the innovative atmosphere in strengthening the positive influence of transformational leadership and organizational culture on employee innovative behavior. Based on these studies, the third hypothesis is proposed:

H3: The innovative atmosphere moderates the relationship between transformational leadership, mediated by organizational culture, and employee innovative behavior.

When considering the impact of transformational leadership on employee innovative behavior in Guizhou universities, this study, based on prior research and related literature, proposes these three key research hypotheses. These hypotheses aim to guide the exploration of the complex relationships within Guizhou universities, particularly in understanding the interplay between transformational leadership and faculty innovation. They are designed to provide practical suggestions and guidance for university administrators to promote the development of a culture of innovation and enhance employee innovation capabilities.

Method

In this study, the relationship between the hypotheses and research design is integral to its methodological approach and the overall validity of its findings. The hypotheses are centered on examining the impact of transformational leadership styles on innovation climate and employee innovative behavior in higher education, with a focus on the mediating role of organizational culture and the moderating role of innovation climate.

To test these hypotheses, the research design employs a questionnaire survey method, rather than observation. This survey approach is methodologically aligned with the objectives of the study as it facilitates the collection of specific, subjective data on perceptions and experiences related to leadership styles, innovation climate, and innovative

behaviors from a large and diverse sample of university faculty and staff.

The questionnaire is designed to gather quantitative data that can be statistically analyzed, providing empirical evidence to either support or challenge the hypotheses. By using a structured survey, the study can effectively measure variables like transformational leadership characteristics, the perceived innovation climate, and the innovative behaviors of employees, along with their perceptions of organizational culture.

Additionally, the research design involves a substantial sample size across various universities in Guizhou, enhancing the generalizability and reliability of the findings. The statistical analysis, possibly including methods like regression analysis, correlation analysis, and possibly factor analysis, is used to examine the relationships and interactions posited in the hypotheses.

In conclusion, the survey-based research design is directly tailored to address the hypotheses of the study, providing a systematic and empirical approach to exploring the complex dynamics between leadership styles, organizational culture, innovation climate, and innovative behavior in the context of higher education.

Participants

This research adopted a questionnaire survey approach targeting representative universities known for innovative behavior in areas such as Guiyang, Zunyi, Anshun, among others. These universities encompass various disciplines including engineering, natural sciences, and humanities. The design employed an online questionnaire platform. The questionnaire link was distributed through online channels to faculty and staff in higher education institutions. Participants were invited to fill out the questionnaire and encouraged to forward it to their leaders and colleagues to enhance response rate and diversity.

A total of 391 questionnaires were distributed, with 31 invalid ones subsequently excluded, resulting in 360 valid responses. The demographic information from the questionnaire survey is presented in Table 1. The participant demographic profile was diverse, comprising 360 individuals with a nearly balanced gender distribution of 52.78% male (n = 190) and 47.22% female (n = 170). Age-wise, the majority are between 26 and 45 years old, with the largest group being 26-35 years old (33.33%, n = 120). In terms of education, most hold a master’s degree (38.89%, n = 140), followed by Bachelor's and Doctorate or higher degrees. The participants' work experience varies, with the largest segment having 1–5 years of experience. The fields of study represented are predominantly engineering (41.67%, n = 150). The majority of participants are regular teachers (66.67%) and a significant proportion are lecturers or below (72.22%). There are fewer participants in managerial positions, with frontline managers, middle managers, and senior managers making up smaller percentages. In terms of academic titles, professors and assistant professors represent smaller groups compared to lecturers and below.

Table 1 Participant Profile

Characteristics	n	%
Gender		
Male	190	52.78
Female	170	47.22
Age		
Under 25 years old	50	13.89
26–35 years old	120	33.33
36–45 years old	110	30.56
46 years old or above	80	22.22
Education		
Bachelor's degree	120	33.33
Master's degree	140	38.89
Doctorate or higher	100	27.78

Work Experience		
Less than 1 year	50	13.89
1–5 years	120	33.33
6–10 years	90	25.00
More than 10 years	100	27.78
Field of Study		
Engineering	150	41.67
Natural sciences	100	27.78
Humanities	110	30.56
Position		
Regular teacher	240	66.67
Frontline manager	60	16.67
Middle manager	40	11.11
Senior manager	20	5.56
Academic Title		
Professor	40	11.11
Assistant professor	60	16.67
Lecturer and below	260	72.22

Instrument

In this study, we collected 360 valid questionnaires and utilized a rating scale from 1 to 5 to assess the impact of transformational leadership, organizational culture, and innovation climate on employee innovative behavior. It is observed that the Cronbach's alpha coefficients for transformational leadership, organizational culture, employee innovative behavior, and innovation climate are .897, .91, .865, and .900, respectively, all exceeding the threshold of .8.

Content validity evaluates whether the measurement tools cover the intended concepts adequately and comprehensively. According to Table 3, expert reviews rated Indicator A at 4.5, Indicator B at 4.2, and Indicator C at 4.8. These high scores indicate experts' agreement on the relevance and comprehensiveness of these indicators in covering the intended concepts effectively.

The results indicated a significant positive correlation between the two ($\alpha = .68$, $p < .001$). This suggests a clear association in Guizhou's universities where a more transformational leadership style is distinctly correlated with more proactive employee innovative behavior.

Regarding the relationship between transformational leadership and employee innovative behavior, correlation analysis was employed.

Data Collection

This study employed three primary scales to assess transformational leadership, employee innovative behavior, and organizational culture (Mohammed & AL-Abrrow, 2023). These scales encompass multiple dimensions and sub-dimensions, covering numerous assessment indicators. During the questionnaire design, specific consideration was given to the background of Guizhou's higher education institutions and the working environment of faculty and staff, ensuring the questions were closely relevant to their actual work. The questionnaire utilized a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and was designed in conjunction with extensive literature review and professional frameworks.

Survey links were distributed to faculty and staff through the university's internal communication platform, email, and academic offices, employing a convenience sampling method. Throughout the survey process, emphasis was placed on the voluntary and anonymous nature of participation, with explicit confidentiality assurances provided for the

data. Over a six-week period, 360 valid questionnaires were collected, encompassing faculty and staff from various departments within Guizhou's higher education institutions. Valid questionnaires were identified based on complete responses meeting predefined quality standards.

All data underwent cleansing and coding processes, removing incomplete or questionable questionnaires. Descriptive statistical analyses were conducted using statistical software like SPSS, exploring average scores, standard deviations, and frequency distributions across dimensions. Subsequently, further analysis and validation of the data were performed using methods such as factor analysis.

This detailed description of the data collection process encompasses questionnaire design, participant recruitment, data collection, and initial processing, providing a robust foundation for subsequent in-depth analysis.

Data Analysis

A mediation analysis was performed, validating the mediating role of organizational culture between transformational leadership and employee innovative behavior using the Bootstrap confidence interval method. The findings revealed that organizational culture significantly mediated this relationship, indirectly influencing employee innovative behavior.

The study utilized confirmatory factor analysis (CFA) through IBM SPSS AMOS 4.1 (Arbuckle, 1994) to evaluate the psychometric characteristics of the constructs being explored. The analytic strategy for inferential statistics in this study is designed to test the hypotheses regarding the impact of transformational leadership styles on innovation climate and employee innovative behavior, with a focus on the mediating role of organizational culture and the moderating role of innovation climate.

If possible, replicating key analyses with different subsets of the data or using cross-validation techniques can further protect against experiment wise error by ensuring that findings are not simply the result of chance variations in a specific sample. By employing these strategies, the study aims to ensure that the inferential statistical analyses are robust, reliable, and valid, providing credible insights into the relationships among the key variables of interest.

Results

Measurement Model

This analysis helps in assessing the construct validity of the conceptual variables, indicating the extent to which these variables accurately reflect the intended underlying concept. The analysis excluded eleven participants due to incomplete data (Tabachnick & Fidell, 1996). For the remaining participants (N = 360), a covariance matrix, derived using the maximum likelihood estimation method, served as the input data for the analysis.

The CFA examined the relationships between the 17 observed variables and four latent variables: transformational leadership (TL), organizational culture (OC), innovation behavior (IB), innovation climate (IC). Table 2 shows the results of the confirmatory factor analysis.

The measurement model in the confirmatory factor analysis (CFA) was evaluated using Hu and Bentler's (1998) two-index combination approach. This approach involves the use of two indices: the Root Mean Squared Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). To minimize the rates of Type I and Type II errors in model specification, irrespective of the sample size, recommended cutoff values were employed for both indices: less than .06 for RMSEA and less than .06 for SRMR (Hu & Bentler, 1999).

The average variance extracted (AVE) for the four constructs ranged from .49 to .90, indicating the proportion of variance captured by the construct in relation to the variance due to measurement error. According to Hair et al. (2006), AVE illustrates the average amount of variation that a latent construct explains in its items, and Bagozzi and Yi (1988) suggest that a good model should explain at least 50% of the variance.

The internal consistency coefficients for each construct were between .74 and .96. These values fall within the acceptable range for internal consistency in applied research, as noted by Nunnally & Bernstein (1994). A reliability coefficient, which measures the extent of measurement error (with 1 indicating no error), further supports the robustness of the constructs, as detailed by Hair et al. (2006). The analysis of the correlation matrix in Table 2 revealed moderate correlations between the constructs.

Table 2 Intercorrelation Matrix

Variable	M	SD	1	2	3	4
1. TL	4.53	0.78	–			
2. OC	4.13	1.11	.836	–		
3. IB	4.21	0.90	.819	.532	–	
4. IC	4.11	1.71	.938	.718	.394	–

Note. TL = transformational leadership, OC = organizational culture, IB = innovation behavior, IC = innovation climate

To assess the distinctiveness of these constructs, two tests for discriminant validity were conducted. The first test applied Fornell and Larcker's (1981) criterion for discriminant validity, which involves comparing the average variance extracted (AVE) for each construct against the squared correlations between the constructs. The results showed that the AVE for each construct was greater than the squared correlations between any two constructs, thus supporting discriminant validity.

The second test for discriminant validity followed Burnkrant and Page's (1982) method, which examines the change in chi-square values when the covariance between pairs of constructs is constrained to 1.0. A significant change in chi-square, defined as a significant increase of more than 3.84, in these pairwise comparisons would indicate discriminant validity. The smallest chi-square difference observed in the analysis was 16.50, which is substantially higher than the baseline of 3.84. This considerable difference, as referenced in Hightower, Brady, and Baker (2002), strongly supports the discriminant validity between each of the constructs in the study.

Confirmatory factor analysis using AMOS revealed an acceptable fit, $X^2 = 44.77$; RMSEA = .06; SRMR = .05 (Hu & Bentler, 1999). Parameter estimates and accompanying t tests substantiated connections between scale items and their respective constructs as significant. The items used to measure each of the four constructs revealed average variance extracted ranging from .56 to .80, indicating all constructs are above the .50 benchmark (Bagozzi & Yi, 1988). Overall, internal consistency estimates for each construct were satisfactory, as they ranged from .72 to .86 (Nunnally & Bernstein, 1994).

Structural Model

The structural test began with the specification of a model to create a statistical statement of relationships between latent variables as determined by the hypotheses tendered. Model specification included the measurement model from the previous stage and a structural model that specifies the relationships among the four latent variables.

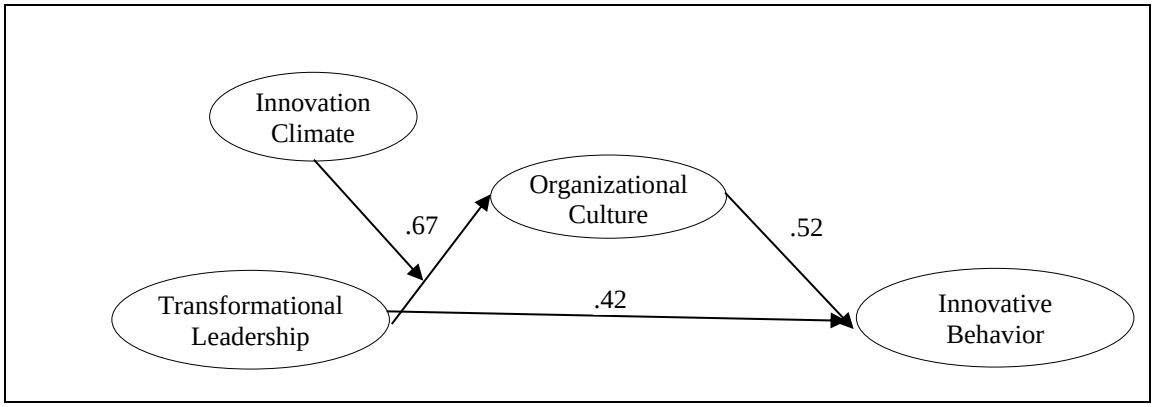
The analysis showed that the 17 items designed to assess the four constructs demonstrated a satisfactory fit with the data: $\chi 2 = 334.05$; RMSEA = .05; SRMR = .05, as per Hu & Bentler (1999) criteria. Parameter estimates and t-tests confirmed significant relationships between each item and its corresponding latent construct.

The testing of the specified sequence yielded results that indicated an acceptable fit to the data: $\chi^2 = 45.82$, RMSEA = .06, SRMR = .05, in line with the criteria set by Hu & Bentler (1999). To further assess the model, additional fit indices were used, revealing an acceptable fit as well: Goodness-of-Fit Index (GFI) = .91, Normed Fit Index (NFI) = .92, and Tucker-Lewis Index (TLI) = .92, following the guidelines of Browne & Cudeck (1993),

Hair et al. (2006), and Kline (1998).

In Figure 1, the standardized regression weights for each proposed link in the model were examined. These weights significantly supported the relationships posited in the study's hypotheses, indicating that the proposed connections within the model were substantiated by the analysis.

Figure 1 Conceptual Framework



Discussion

The results of this study provide substantial support for the proposed hypotheses, offering new insights into the dynamics of leadership and innovation within Guizhou's higher education sector. The validation of this hypothesis demonstrates the significant impact of transformational leadership on innovative behavior among faculty and staff. This finding aligns with existing leadership theories (Rashwan & Ghaly, 2022), which emphasize the crucial role of leadership traits–including individualized consideration, inspirational motivation, intellectual stimulation, and idealized influence–in cultivating a conducive environment for innovation.

The confirmation of the second hypothesis further enhances our understanding by elucidating the mediating role of organizational culture in this process. This aspect of the findings underscores the significance of the organizational culture in not only reflecting but also amplifying the influence of transformational leadership on innovative behaviors. This mediating role of organizational culture aligns with the broader organizational behavior literature, which recognizes culture as a pivotal factor in shaping employee behavior and attitudes (Shao, Feng, & Liu, 2012).

Additionally, the study's exploration of innovation climate as a moderator reveals nuanced interactions within the leadership-innovation nexus. The finding that a positive innovation climate amplifies the effects of transformational leadership traits on innovative behavior offers a more intricate understanding of how external factors can enhance or hinder the influence of leadership on innovation (Zhang & Bao, 2019).

Overall, these findings contribute significantly to the theoretical discourse on leadership and innovation in higher education, particularly within the unique context of Guizhou Province. They not only validate key aspects of transformational leadership theory but also extend our comprehension of how organizational culture and external climates interact with leadership to influence innovation. For practice, these insights suggest that university administrators and policymakers should focus on nurturing transformational leadership qualities, cultivating a robust organizational culture, and promoting a positive innovation climate to enhance the innovative capabilities of their institutions.

One of the key differences lies in the contextual focus of the study. While much of the existing research on transformational leadership and innovation is set in Western or corporate contexts, this study is distinct in its exploration within the higher education sector of Guizhou Province. This unique setting may account for variations in how leadership styles and organizational culture are perceived and how they influence innovation.

The examination of the Innovation Climate as a moderating factor offers a new dimension that is not extensively covered in previous studies. While the impact of external environmental factors has been acknowledged, the specific exploration of how a positive Innovation Climate can amplify the effects of transformational leadership on innovation adds a novel perspective to the existing literature.

The influence of regional and cultural factors, particularly in the context of Guizhou Province, might present differences in how transformational leadership and organizational culture manifest and impact innovative behaviors compared to studies conducted in other regions or cultures.

In summary, while this study aligns with existing research in affirming the significance of transformational leadership and the mediating role of organizational culture in fostering innovation, it diverges in its focus on the higher education sector in a specific regional context and in its emphasis on the moderating role of the Innovation Climate. These distinctions contribute to a more nuanced understanding of the dynamics of leadership and innovation in diverse settings.

Implications for Future Research

Future research can further explore the impact mechanisms of leadership traits on innovative behavior based on the actual context of universities in Guizhou. This exploration could involve different disciplines, specialties, or university hierarchies to investigate how specific educational backgrounds influence the effects of traits like individualized consideration, inspirational motivation, intellectual stimulation, and idealized influence on the innovative behavior of faculty and staff. Moreover, expanding the scope of study to encompass different types of universities—such as undergraduate institutions, teacher-training colleges, or institutions specialized in finance and economics—could help discern the varying impact of leadership styles on innovation climate and employee innovative behavior across different university types.

In-depth research into the interaction between individual traits of faculty and staff and leadership styles is also worth pursuing. Particularly, within Guizhou's distinct cultural and social backdrop, understanding how individual traits adapt to different leadership styles and their interactive patterns could be insightful. These studies will aid in better understanding the impact mechanisms of leadership styles on the innovative behavior of faculty and staff in Guizhou's universities, offering more specific leadership intervention suggestions and practical guidance for various types of universities.

Implications for Practice

The discovery that an affirmative innovation climate intensifies the impact of transformational leadership characteristics on innovative behavior provides a deeper comprehension of the ways in which external elements can either augment or impede the effectiveness of leadership in driving innovation. This insight is particularly valuable for educational administrators and policymakers, as it highlights the importance of fostering an environment that is receptive and supportive of innovative endeavors.

These findings provide specific practical guidance for administrators in Guizhou's higher education institutions. Recommendations include nurturing transformational leadership traits while emphasizing the development of organizational culture to foster a positive innovation climate. Further suggestions encompass prioritizing individualized consideration, inspirational motivation, intellectual stimulation, and idealized influence among faculty and staff, and actively fostering an environment that encourages innovation. These insights underscore the intricate relationship between leadership styles and innovative behavior within the environment of higher education institutions in Guizhou, offering guidance and insights to university administrators. For enhancing competitiveness and ensuring sustained development, shaping positive attributes such as individualized consideration, inspirational motivation, intellectual stimulation, and idealized influence,

strengthening organizational culture, and cultivating innovation climate play pivotal roles.

Based on the current research findings, some crucial insights for policymaking in Guizhou's universities emerge. Firstly, it's recommended that university administrations prioritize the cultivation and selection of leaders, focusing on nurturing leadership traits like individualized consideration, visionary inspiration, motivational encouragement, and exemplary conduct. Policies could encourage, support, and reward leaders' development and practice in these aspects while providing relevant training and developmental opportunities.

Secondly, advocating for and optimizing policies pertaining to organizational culture development within universities is suggested. Strengthening organizational culture could foster faculty and staff's identification and internalization of leadership traits such as individualized consideration, visionary inspiration, motivational encouragement, and exemplary conduct. Policies could be implemented through cultural inheritance plans, reinforcement strategies, and encouragement of cultural activities.

Additionally, fostering an innovative atmosphere is crucial. Policy initiatives could be geared toward fostering a positive, open, and innovation-driven environment within universities to stimulate the innovative potential of faculty and staff. Creating such an atmosphere could involve providing support for innovative projects, organizing innovation exchange activities, and establishing innovation incentive mechanisms. These policy recommendations aim to guide university administrators and policymakers, supporting and driving advancements in leadership development, organizational culture, and the fostering of innovative environments in Guizhou's universities.

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