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A Study on the Mechanism of the Impact of Multidimensional Leadership Styles on Employee Innovation Behavior Based on Structural Equation Modeling Analysis

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Abstract: Traditional people-oriented management approaches emphasize placing employees at the core while neglecting the impact of employees' negative emotions. Given this, how to effectively manage subordinates' negative emotions and stimulate employees' innovative behavior has become an urgent issue for both academia and managers to address. This study proposes five research hypotheses based on the theoretical framework of leadership style and employee innovative behavior, utilizing structural equation modeling. Through empirical analysis, it measures the multidimensional leadership style and employee innovative behavior variables and tests each hypothesis individually. It was found that transformational leadership, transactional leadership, laissez-faire leadership, servant leadership and empowerment leadership all had a significant impact on employees' innovative behaviors. Among them, laissez-faire leadership showed a significant negative impact on employee innovation behavior ($p=-0.584$, $p<0.001$), while the other four leadership styles showed a significant positive impact.

Keywords: structural equation modeling; path analysis; multidimensional leadership style; employee innovation behavior

1. Introduction

In today's highly competitive business environment, a company's innovation capability has become a key factor determining its success or failure [1-2]. As the main drivers of innovation, employees' innovative behavior is closely linked to leaders' multidimensional leadership styles [3-4]. The impact of multidimensional leadership styles on employee innovation behavior is a topic of significant interest, particularly in terms of transformational leadership styles, authoritative leadership styles, and managerial leadership styles [5-7].

Transformational leadership emphasizes encouraging employees' creativity and innovation [8]. They tend to give employees more autonomy and decision-making power, encouraging them to come up with new ideas and ways to solve problems [9-10]. This leadership style can stimulate employees' enthusiasm and innovative potential, thereby promoting the organization's innovative development [11]. In contrast, authoritative leadership places greater emphasis on the leader's authority and decision-making capabilities [12]. They provide clear instructions and goals, require employees to follow their directives, and monitor and evaluate employees' work [13-14]. While this leadership style ensures organizational operational efficiency, it may suppress employees' willingness and ability to innovate [15-16]. The managerial leadership style lies between transformational and authoritarian leadership [17]. It emphasizes employee participation and teamwork, and places importance on training and guiding



employees [18]. This leadership style can to some extent stimulate employees' innovative behavior, but compared to transformational leadership, managerial leadership may still lack sufficient exploration of employees' innovative potential [19-21].

Of course, in addition to leadership style, incentive mechanisms are also important factors influencing employees' innovative behavior [22]. Leaders can use incentive mechanisms to encourage employees to propose innovative ideas and solutions [23]. For example, establishing an innovation reward system that provides rewards and promotion opportunities to employees who contribute to innovation will further stimulate employees' innovative motivation [24-25]. Building an innovation culture within the organization is also an important means of promoting employees' innovative behavior [26]. Leaders can shape an innovative culture through organizational values and behavioral norms, encouraging employees to explore new solutions and work methods [27-28]. Only with the support of an innovative culture can employees fully unleash their innovative potential [29].

Reference [30] analyzed the effects of transformational leadership style and transactional leadership style, as well as the impact of the components of these two styles on innovative behavior, revealing that both leadership styles effectively enhanced employees' innovative behavior. Reference [31] examined the influence of leadership style on organizational citizenship behavior (OCB) among service industry employees, with results indicating that both transformational leadership and transactional leadership have positive effects on OCB, emphasizing the importance of selecting an appropriate leadership style based on specific circumstances. Literature [32] explores the relationship between transformational leadership, transactional leadership, and empowering leadership and employee innovative behavior. Based on survey analysis, it suggests that empowering leadership moderates the association between transformational leadership and innovative behavior. Literature [33] uses a sample of new-generation employees and psychological capital as a mediating variable to discuss the impact of inclusive leadership style on employee innovative behavior, concluding that there is a significant and positive correlation between inclusive leadership style and employee innovative behavior. Literature [34] aims to provide a framework for understanding and predicting the impact of leadership styles and employee creativity on corporate innovation, and elucidates the connections between transformational leadership, transactional leadership, and the various components of organizational innovation. Literature [35] aims to review the body of knowledge on how to address resistance to change (RTC) through leadership styles to achieve desired organizational outcomes, emphasizing the role of leadership styles in successfully implementing organizational change. Literature [36] analyzes the relationship between leadership styles, employee well-being, and organizational creativity, emphasizing the role of leadership in fostering an innovation-driven culture, the impact of different leadership approaches on the innovation process and employee morale, and the importance of supportive leadership styles in modern organizations. Literature [37] aims to determine the impact of leadership styles and employee capabilities on employee performance through organizational citizenship behavior. A study based on simple random sampling methods indicates that leadership styles have a negative impact on employee performance but a positive impact on citizenship behavior, while the employee capability variable has a significant positive impact on employee performance. Literature [38] seeks evidence on the relationship between transformational, transactional, and laissez-faire leadership styles and employee loyalty in the insurance industry. The study indicates that these three leadership styles play a significant role in determining employees' loyalty levels toward the organization. Literature [39] analyzed the relationship between transformational leadership and employees' acceptance of change, with results emphasizing a positive correlation between transformational leadership and employees' acceptance of change, influenced by employees' innovative behavior and the extent of information technology use. Literature [40] aimed to examine the impact of transformational leadership on employees' innovative behavior and the mediating role of learning motivation, with results indicating that transformational leadership positively influences employees' innovative behavior and learning motivation. Literature [41] constructs a model of the impact of servant leadership on employees' innovative behavior, incorporating employees' perceived status as a variable to explain the interactive mechanisms among employees, laying the foundation for empirical research. The above studies emphasize the significant role of leadership styles in organizational development and introduce the effects of transformational leadership style, transactional leadership style, servant leadership style, and inclusive leadership style on employee innovative behavior and organizational loyalty, elucidating the differences in the impacts of various leadership styles.

This paper draws on the backdrop of socio-economic development and management transformation to summarize multi-dimensional leadership styles, including charismatic, transformational, transactional, and collaborative leadership. It extracts the meanings of innovation and employee innovative behavior from the concept of innovation and reveals their roles. It clarifies the relationships among multi-dimensional leadership, employee creative behavior, and organizational innovation climate, and proposes relevant research hypotheses. Following literature review and pilot testing, the reliability and validity of

the questionnaire were comprehensively analyzed to determine the survey questionnaire used in this study. The MLQ and Janseen surveys were employed to measure multidimensional leadership styles and employee innovative behavior.

2. Theoretical basis and research hypotheses

2.1. Theoretical Basis

2.1.1. Leadership Style Theory

In the field of management studies, traditional leadership theories have been developed and applied alongside corporate management practices. These theories are characterized by an emphasis on power and organizational hierarchy, and have played an important role in corporate management. However, with the development of society and the economy, and the challenges posed by management reforms, leadership theory research and practice have continued to evolve, rendering traditional leadership theories and models increasingly unsuitable for the demands of the times. Since the 1990s, with the rapid advancement of technology and the swift update of information in the big data era, organizations have been seeking new forms of leadership to guide their members in collaborative work.

Based on the relevant review in the previous text, this study classifies leadership styles into five types: Transformational leadership, Transactional leadership, Laissez-faire leadership, Servant leadership, and Empowerment leadership [42].

2.1.2. Innovation and Employee Innovation Behavior Theory

“Innovation” fundamentally refers to “establishing a new production function,” that is, “the recombination of production factors.” This involves introducing a “new combination” of production factors and production conditions that has never existed before into the production system to achieve a “new combination” of production factors or production conditions. From this concept, it can be seen that innovation encompasses several meanings:

- (1) Innovation is endogenous to the production process;
- (2) Innovation represents a “revolutionary” change;
- (3) Innovation must be able to create new value.

Since the purpose of innovation lies in action, practice, and the creation of value, innovation, in a certain sense, is the reorganization of products, creating new product value and thereby generating new consumption. The practice of innovation concepts involves transforming these concepts into feasible practices that organizations or teams can effectively emulate, expand, and utilize through innovation standards or models. Therefore, it is essential to convert innovation concepts into innovative actions. From this perspective, innovation is synonymous with innovative behavior.

One manifestation of insufficient innovation momentum among Chinese enterprises is that a significant proportion of innovation remains imitative, reactive, or responsive in nature. Imitative innovation refers to the practice of following the lead of others by replicating their innovative thinking, models, and techniques. Reactive or responsive innovation refers to innovative behaviors generated in response to organizational needs, indicating that employees' proactive innovative behaviors require organizational stimulation. Employee-driven innovation refers to employees proactively improving their work environment and voluntarily taking on responsibilities. In addition to factors such as insufficient organizational investment in innovation activities, inadequate innovation capabilities, and incomplete incentive mechanisms, there is also a notable lack of innovation motivation provided to employees. Therefore, studying the key factors influencing individual employee innovation behavior and its motivation, and revealing the underlying mechanisms, is of great significance for enhancing the overall innovation level of enterprises [43].

2.2. Research Hypothesis

- (1) The influence of transformational leadership style on the innovative behavior of employees.

When employees feel the kindness from their leaders, they are highly likely to respond with positive feedback, including positive attitudes and behaviors, and vice versa. Extending this to the leadership dimension, the differentiating traits of leadership style can have varying degrees and directions of influence on employees' innovative behavior. Due to the characteristic of transformational leadership that cares about the well-being and development of employees, the exemplary power it demonstrates can not only inspire employees but also maximize the potential of individual employees, enabling them to take on responsibilities and fulfill their obligations with courage. Therefore, the common view in the academic circle holds that transformational leadership can positively influence employees' innovative

behaviors. The behavior of transformational leaders who regard employees as "one of their own" makes employees feel recognized by the organization, prompts them to pursue consistency with the organization's goals, and thereby stimulates innovative behavior among employees.

Based on the above viewpoints, this paper proposes the following assumptions:

H1: Transformational leadership has a positive impact on the innovative behavior of employees in middle and back-office departments.

(2) The influence of transactional leadership style on employees' innovative behavior.

Employee behavior is influenced by managers. If leaders create an organizational environment suitable for innovation and encourage and affirm employees' innovative behaviors, it will prompt employees to engage in more innovative activities. The combination of transactional leadership style and purposeful action can generate positive emotions in employees, thereby inspiring them to innovate. Company leaders need to have a relatively clear understanding of the members of the organization they lead, be able to clearly define the rights and responsibilities involved, and have a certain degree of control over the possible responsibilities, obligations and resource allocation in the transactions between both parties. In this way, at work, employees can not only receive physical rewards issued in advance but also receive spiritual rewards.

Based on the above viewpoints, this paper proposes the following hypotheses:

H2: Transactional leadership has a positive impact on the innovative behavior of department employees.

(3) The influence of a laissez-faire leadership style on employees' innovative behaviors

Laissez-faire leadership is a style of leadership that adopts a completely open attitude, shows indifference to the organization and subordinates, does not exercise power, evades taking responsibility, and only plays a passive supporting role without providing further guidance and supervision to employees. Under this leadership style, the absence of the leader's management functions will bring intangible pressure and frustration to team members, which is manifested in a negative impact on employees' innovative behaviors. Laissez-faire leadership can cause subordinates to feel the pressure of ambiguous roles, and this is especially true for employees in the back-office support departments who do not directly generate economic benefits but only play a supporting and safeguarding role. The incompetence of a laissez-faire leader can cause a certain degree of cognitive impairment for employees, leading to career confusion and uncertainty, and ultimately affecting the generation of innovative behavior.

Based on this, this paper proposes the following assumptions:

H3: Laissez-faire leadership has a negative impact on the innovative behavior of employees in middle and back-office departments.

(4) The influence of servant leadership style on employees' innovative behavior.

Servant leadership is a leadership style that is people-oriented, prioritizes the needs of employees, and aims to promote the development and well-being of employees. One major difference from most leadership styles is that this style is employee-centered, while others are leader-centered. In the process of serving employees, servant leaders generally exhibit the following behavioral characteristics: empowering employees, helping them grow, possessing conceptual skills, putting employees first, behaving ethically, caring about employees' emotions, and creating value for a larger community.

Based on this, this paper proposes the following assumptions:

H4: Servant leadership has a positive impact on the innovative behavior of department employees.

(5) The influence of empowerment leadership style on employees' innovative behavior.

From the four dimensions of empowerment leadership (emphasizing the significance of work, promoting decision-making participation, expressing confidence in high performance, and weakening bureaucratic constraints), each dimension will have a positive impact on promoting the innovative behavior of knowledge workers. According to social cognition theory, leaders have a thorough understanding of knowledge workers and their job content. By emphasizing the significance of work to employees, leaders can help them better understand and identify with the work they are engaged in, and stimulate their enthusiasm for work. In a knowledge economy society, knowledge has become the core production factor of society. The transmission, application and innovation of knowledge have become the driving force of productive forces. Innovation activities play an extremely important role in organizational development and social progress.

Based on this, this paper proposes the following assumptions:

H5: Empowerment leadership has a positive impact on the innovative behavior of department employees.

3. Research design

3.1. Questionnaire Design and Distribution

3.1.1. Questionnaire Design

This study employed a questionnaire survey method to collect research data, primarily utilizing the following approaches to design and refine the questionnaire [44]:

(1) Literature review. The study extensively reviewed domestic and international literature on multidimensional leadership traits, multidimensional leadership styles, knowledge sharing, and employee innovation performance, among other topics. This process established the foundational framework for questionnaire design. Building upon the analysis, synthesis, and summary of various research findings, an initial draft of the questionnaire was developed.

(2) Pre-testing: Prior to the formal distribution of the questionnaire, a small-scale sample test was conducted to comprehensively analyze the reliability and validity of the questionnaire. Additionally, interviews were conducted with the test participants to gather their specific opinions on the questionnaire design, further refining the survey questionnaire to ensure its reasonableness and acceptability.

3.1.2. Questionnaire distribution

As this paper studies the influence of different dimensions of leadership styles on employees' innovative behaviors, employees in enterprises and public institutions (with immediate superiors) are determined as the survey subjects, and the relationship between the research variables is determined through their scores for their immediate superiors.

Distribution method: The questionnaire was primarily distributed online. With the assistance of mentors, classmates, friends, and MBA students, the survey was distributed to individuals across various industries, with a particular focus on seeking out corporate employees to complete it. After the survey was completed, a total of 342 questionnaires were distributed, with 323 valid responses.

3.2. Variable measurement

3.2.1. Measurement of Leadership style

For the measurement of transformational and transactional leadership, we conducted a questionnaire survey based on the items designed by Sethibe, T and Steyn, R in 2017. The laissez-faire leadership style, referring to the items designed by Silva, S and Mendis, B in 2017. While the servant and empowerment leadership styles, referring to the items designed by Liao, S and Zhu, X in 2021, this scale is more suitable for the Chinese context than others.

By collating the above literature, we have conducted a test on leadership styles, which includes five specific dimensions: transformational leadership, transactional leadership, laissez-faire leadership, servant leadership, and empowerment leadership, totaling 38 items. The scale was based on the Richter 5-point scale, with degrees ranging from strongly disagree to strongly agree, and respondents rated their immediate leaders.

3.2.2. Measurement of employee innovation behavior variables

Employee innovation behavior is the measured variable in this paper. Scholars have also analyzed and verified the measurement of employee innovation performance from different dimensions. The most widely used one is Janseen's determination of innovation performance, which proposed the measurement of employee innovation performance in three dimensions and eight items.

4. Empirical analysis of multidimensional leadership styles on employee innovation behavior

4.1. Empirical Analysis

4.1.1. Descriptive statistical analysis of samples

Descriptive statistical analysis was primarily conducted on the personal information of respondents and their company information, with the aim of examining whether the collected data was evenly

distributed. This study sought to verify that leaders can effectively leverage their strengths to motivate employees and further enhance their innovative behavior, even across different departments, companies, and industries. This study posits that multidimensional leadership traits are unique to leaders or more pronounced characteristics that are not influenced by employees' personal circumstances or the company's environment. Therefore, only frequency analysis is conducted on the following information to verify the uniformity of data distribution. Table 1 presents the descriptive statistical analysis.

The gender ratio of respondents was nearly 1:1, with the majority aged between 26 and 35, accounting for 56.42%. Educational attainment was concentrated at the bachelor's and master's degree levels, accounting for 73.87%. This survey primarily targeted corporate employees, with front-line managers and ordinary employees accounting for 93.64% of the sample. This aligns with the survey's objective, which aimed to derive final research conclusions through employees' evaluations of leadership and assessments of innovation performance. The majority of respondents were employed by private enterprises, accounting for 40.3%, followed by foreign-invested and state-owned enterprises, accounting for 17.8% and 15%, respectively. This also indicates that multi-dimensional leadership is relatively common in private enterprises, while foreign-invested enterprises, which place greater emphasis on individual capabilities, offer relatively more opportunities for outstanding employees to assume leadership roles. The distribution of departments and industries among respondents was relatively even, primarily concentrated in manufacturing, education, culture, and sports and entertainment. Through the above analysis, it is demonstrated that the distribution of both individual background information and enterprise information in this survey was relatively even, ensuring the rationality and applicability of the survey.

Table 1. Descriptive statistical analysis.

Personal background information	Description index	Effective percentage /%
Gender	Male	45
	Female	55
Age	Age 25 and below	19.24
	26-30	31.42
	31-35	25
	36-40	13.2
	41-45	11.14
Educational background	Junior college and undergraduate	23.46
	master	47.63
	doctor	26.24
		2.67
Position	General employee	83.4
	Grassroots leader	10.24
	Middle leader	4.3
	Top leader	2.06
Subordinate department	Human resources department	16.42
	Technical research and development department	11
	Finance department	15
	Purchasing department	7
	Marketing Department	24
	Legal department	4
	Other	22.58
Business information	Description index	
Enterprise attribute	State-owned enterprise	15
	Joint venture	13.4
	Foreign enterprise	17.8
	Collective enterprise	6.4

	Private enterprise	40.3
	Other	7.1
Industry properties	manufacturing	25
	Financial sector	11
	Real estate	8
	Education	15
	Science research and technology services	7
	Culture, sports and entertainment	10
	Information transport, software and information technology services	7
	Health and social work	6
	Other	11

4.1.2. Reliability and validity analysis

Reliability analysis, also known as validity analysis, was conducted in this study using SPSS version 24.0 to test the reliability of the survey questionnaire. The results of the reliability analysis were primarily assessed using the Cronbach's α coefficient. Cronbach's α was proposed by Cronbach in 1951 and is currently the most commonly used measure of reliability in social science research. The α value should fall between 0 and 1, with values closer to 1 being better. Typically, an α coefficient greater than 0.7 is considered acceptable, while values between 0.8 and 0.9 indicate high reliability. In other words, the higher the α coefficient (the closer to 1), the better the internal consistency of the questionnaire and the higher the reliability.

Table 2 shows the results of the internal consistency test of the scale. The α values for each dimension of multidimensional leadership traits are 0.889, 0.873, 0.871, 0.885, and 0.874, respectively. The α value for each dimension is greater than 0.7. Employee innovation behavior, as a complete dimension, also have an α value greater than 0.7. This proves that the internal consistency of the questionnaire is good and its reliability is high.

Table 2. Scale internal consistency test results.

Scale	Dimension	Item	Cronbach- α
Multidimensional leadership traits	Transformational leadership	7	0.889
	Transactional leadership	8	0.873
	Laissez-faire leadership	7	0.871
	Servant leadership,	9	0.885
	Empowerment leadership	7	0.874
Employee innovation behavior scale	Employee innovation behavior	8	0.869

The scales used in this survey questionnaire are based on a review of the literature, drawing on established scales and combining them with the actual research, and therefore have a certain degree of content validity. Table 3 shows the KMO and Bartlett tests for multidimensional leadership traits and employee innovation behavior.

The multidimensional leadership trait quality index is $KMO = 0.836 > 0.7$, and the Bartlett's sphericity test statistic is 2920.566, with $p = 0.000 < 0.05$. Therefore, factor analysis of multidimensional leadership traits can be performed.

The KMO value for employee innovation performance is 0.873, with $p = 0.000 < 0.05$, which indicates that factor analysis can be performed. The KMO and sphericity test results are shown in the table below. One component with an eigenvalue greater than 1 can be extracted, and employee innovation performance can also be analyzed as a dimension.

Table 3. Leadership traits and employee innovation behavior KMO and Bartlett tests.

Multidimensional leadership traits	
KMO sampling availability number	0.836

Butterley ball test	Approximate card	2920.566
	Freedom	125
	Significance	0.000
Employee innovation behavior		
KMO sampling availability number		0.873
Butterley ball test	Approximate card	675.615
	Freedom	15
	Significance	0.000

Convergent validity and discriminant validity: Convergent validity, also known as convergent validity, can verify whether multiple measurement indicators reflect the same construct (latent variable). Discriminant validity, also known as discriminant validity, is verified by comparing the square root of the average variance extracted (AVE) with the correlation coefficients of each dimension. The AVE values, correlation coefficients for each dimension, and the square root of AVE are shown in Table 4: The AVE values in the table range from 0.563 to 0.684, all exceeding 0.5, indicating good convergent validity of the scale. The values obtained by taking the square root of AVE (data on the diagonal) are all greater than the corresponding correlation coefficients below them and greater than the correlation coefficients in the adjacent columns, indicating good discriminant validity of the questionnaire in this study.

Table 4. Scale Convergence Validity and Discriminant Validity.

/	AVE	Employee innovation	Transformational leadership	Transactional leadership	Laissez-faire leadership	Servant leadership	Empowerment leadership
Employee innovation	0.563	0.725					
Transformational leadership	0.592	0.634	0.773				
Transactional leadership	0.684	0.534	0.428	0.848			
Laissez-faire leadership	0.632	0.713	0.524	0.335	0.792		
Servant leadership	0.654	0.528	0.354	0.308	0.456	0.803	
Empowerment leadership	0.653	0.651	0.594	0.364	0.648	0.348	0.812

4.1.3. Relevance analysis

From theoretical analysis, it can be seen that there should be a certain degree of correlation between each variable, and the correlation coefficient should be statistically significant. This is the basis for further establishing a structural equation model to verify the hypothesis in detail [45].

SPSS was used to analyze the correlation between the six variables in the research model: transformational leadership, transactional leadership, laissez-faire leadership, servant leadership, empowerment leadership, and employee innovation. The analysis results are shown in Table 5. The correlation coefficients between variables are significant at the 0.01 level, and the correlation coefficients are positive, which basically verifies the original hypothesis. The correlation coefficients range from 0.294 to 0.618, and the correlation coefficients are relatively low, proving that there is no multicollinearity problem. Structural equation modeling can be further used to verify the significance of the paths.

Table 5. Correlation Analysis

/	Transformational leadership	Transactional leadership	Laissez-faire leadership	Servant leadership	Empowerment leadership	Employee innovation
Flexible leadership	1					
Personal care	0.317**	1				
Incentive	0.598**	0.392**	1			
Intelligent excitation	0.348**	0.294**	0.318**	1		
Knowledge sharing	0.524**	0.295**	0.486**	0.434**	1	
Employee innovation	0.544**	0.458**	0.618**	0.468**	0.547**	1

4.2. Hypothesis testing

This study was conducted using hierarchical regression analysis.

Firstly, Model 1 was created, with working years (Y Work) and the time spent working with immediate supervisors (S work) as control variables, and the innovative behavior of employees was introduced as the dependent variable to construct a preliminary regression equation. Secondly, the transformational leadership style, transactional leadership style, laissez-faire leadership style, servant leadership style and empowerment leadership style were respectively introduced into the regression equation to obtain Models 2, 3, 4, 5 and 6. After excluding the influence of control variables mentioned above, the impact of the five different leadership styles on employees' innovative behaviors was studied.

The results of the effect test are shown in Table 6. Firstly, after eliminating the influence of control variables and adding the predictor variable of transformational leadership style to Model 1, Model 1 became Model 2. The determination coefficient R^2 of the model changed from 0.003 to 0.523, indicating that the explanatory effect of the transformational leadership style on the total variation of employees' innovative behaviors increased by 25.3%. Moreover, from Model 1 to Model 2, the F value changed from 0.525 to 75.358, the ΔF was 227.93, and the t-test also reached a significance level of 0.001. The F value of Model 2 was significant. Meanwhile, the $\beta=0.782$ of Model 2 after introducing the transformational leadership style, $p<0.001$, indicates that the standard regression coefficient of the transformational leadership style on employees' innovative behavior is 0.782, and t has also reached the significance level of 0.001. Therefore, if H1 is verified, there is a strong correlation between transformational leadership and employees' innovative behavior, and it is positively significant (Model 2: $\beta=0.718$, $p<0.001$).

Table 6. Results of direct effect test.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Y Work	0.062	0.039	0.029	0.031	0.043	0.051
S work	-0.084	-0.08	-0.056	-0.047	-0.023	-0.013
Leadership style	/	0.782***	0.537***	-0.584***	0.533***	0.472***
R^2	0.003	0.523	0.425	0.422	0.531	0.563
ΔR^2	0.003	0.519	0.413	0.456	0.528	0.548
F	0.525	75.358	48.5	51.386	28.325	63.428
ΔF	0.525	227.93***	140.23***	153.35***	113.15***	182.42***
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Y Work	0.062	0.039	0.029	0.031	0.043	0.051
S work	-0.084	-0.08	-0.056	-0.047	-0.023	-0.013
Leadership style	/	0.782***	0.537***	-0.584***	0.533***	0.472***
R^2	0.003	0.523	0.425	0.422	0.531	0.563

ΔR^2	0.003	0.519	0.413	0.456	0.528	0.548
F	0.525	75.358	48.5	51.386	28.325	63.428
ΔF	0.525	227.93***	140.23***	153.35***	113.15***	182.42***

Similarly, after eliminating the influence of control variables, by adding predictor variables transactional leadership, servant leadership, and empowerment leadership to Model 1, Model 1 becomes Model 3, Model 5, and Model 6. Similar to the results of Model 2, all three leadership styles have a significant positive impact on employee innovation, with their standard regression coefficients being 0.537, 0.533, and 0.472 respectively ($p < 0.001$). Hypotheses H2, H4, and H5 have all been verified.

Finally, after eliminating the influence of control variables, when the influence of the predictor variable, the laissez-faire leadership style, was added to Model 1, Model 1 became Model 4, and the determination coefficient R^2 of the model changed from 0.003 to 0.425, indicating that the laissez-faire leadership style increased the explanation of the total variation in the innovative behavior of middle and back-office employees by 42.5%. Moreover, the F value changed from 0.525 to 51.386, the ΔF was 153.35, and the t-test also reached a significance level of 0.001. The F value of Model 4 was significant. Meanwhile, the p of Model 4 after introducing the laissez-faire leadership style is -0.584, and $p < 0.001$. This indicates that the standard regression coefficient of the transformational leadership style for the innovative behavior of middle and back-office employees is -0.584, and t has also reached the significance level of 0.001. Therefore, if H3 is verified, there is a strong correlation between laissez-faire leadership and employees' innovative behavior, and the negative correlation is significant (Model 4: $p = -0.584$, $p < 0.001$).

5. Conclusion and Outlook

5.1. Conclusion

Based on the theoretical foundation of leadership styles and employees' innovative behaviors, this paper proposes related research hypotheses and uses the structural equation model to study the influence mechanism path of multi-dimensional leadership styles on employees' innovative behaviors. Before further constructing the structural equation model, a correlation analysis of the variables proposed in this paper is conducted. The correlation coefficient ranges from (0.294, 0.618), and the correlation coefficient is relatively low. Therefore, regression analysis can be used to verify the significance of the path. Through hierarchical regression analysis, it was found that transformational leadership, transactional leadership, laissez-faire leadership, servant leadership and empowerment leadership all had a significant impact on employees' innovative behaviors. Among them, laissez-faire leadership showed a significant negative impact on employee innovation behavior ($p = -0.584$, $p < 0.001$), while the other four leadership styles showed a significant positive impact.

5.2. Discussion

This paper explores the mediating role of organizational innovation climate based on a multidimensional leadership and innovation behavior correlation model, advancing research in leadership theory, innovation climate effect theory, and organizational innovation. However, due to research conditions and the current state of knowledge, there are certain limitations in both theoretical analysis and abstraction, as well as in research method design. These limitations also represent areas for future research development. The specific conclusions are summarized as follows:

(1) Lack of development of a scale for measuring organizational innovation climate in the Chinese context

Although this study has conducted extensive work on the foundational concepts and related scales of team atmosphere, the actual research still adopted the relatively mature "Situational Outlook Questionnaire" (SOQ) from Europe and America as the main questionnaire, without developing a new innovation atmosphere scale tailored to the Chinese context. While this approach facilitates comparisons of innovation atmosphere research across different cultural contexts, it makes it difficult to identify the most suitable approach for Chinese enterprises. Additionally, it may result in information loss regarding the structure and content of innovation atmosphere research in certain critical areas. This is because the SOQ primarily addresses internal "soft environment" issues within organizations, while other "hard environment" indicators, such as the adequacy of corporate resources and sustainable development, are not covered. This limitation weakens the explanatory power and association between innovation atmosphere and employee innovation behavior and innovation performance.

(2) Innovation performance scale uses subjective assessment indicators

Firstly, due to the objectives of the National Natural Science Foundation application, this paper is limited to technological innovation achievements. Therefore, it only uses employee innovation behavior to evaluate technological innovation behavior or process performance, and product or service innovation to reflect the output performance of technological innovation. However, technological innovation cannot be separated from the support of management innovation, institutional innovation, and market innovation. Second, the use of self-reporting methods to survey corporate innovation performance has certain limitations. For frontline employees in large enterprises, they may not fully understand the technological innovation achievements of their company and may simply rely on corporate reputation when answering innovation performance items, which may weaken the relationship between innovation atmosphere and innovation performance. It is recommended that future research combine objective and subjective indicators in measuring innovation performance, such as the number of patents obtained in the past three years or the number of advanced production facilities introduced. Additionally, the degree of technological innovation can be assessed based on the novelty of products or services relative to the company, industry, or global market, enabling a more refined analysis of the significant differences in innovation atmosphere between them, which may be more persuasive.

(3) More reliably verify the research hypotheses proposed in this study

The samples collected by this research institute are mainly concentrated in East China, South Central China, and South China, covering enterprises in the Pearl River Delta and Yangtze River Delta regions. No enterprises in North China were surveyed. Due to the obvious cultural differences between North and South China, if more samples from enterprises in North China could be added, the data would cover a wider range of cultural differences, and the conclusions drawn would perhaps be more universally applicable.

(4) It is recommended to use a multi-level model to explore the structure of the innovation atmosphere.

This study primarily utilizes average values aggregated from individual-level data at the organizational level. Although the validity of data integration was assessed prior to aggregation using consistency coefficients and one-way analysis of variance (ANOVA), it remains unclear what proportion of the total variance in organizational innovation climate is explained by individual-level factors, and what proportion is explained by team or organizational-level factors. Additionally, the extent to which the structure of innovation climate resembles that at the individual, team, and organizational levels remains unexplained. These issues can be addressed through multilevel model analysis, as one of its advantages is the ability to decompose total variance into between-group variance and within-group variance while simultaneously calculating the factor structure at the individual and team or organizational levels.

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