



The impact of servant leadership on team innovative performance: Mediating role of employee innovative behavior

Luxi Ren¹

Hui Guo²

Huayu Shen^{*}

¹Innovation College, North-Chiang Mai University, Chiang Mai, Thailand.

¹Email: 544276792@qq.com

²Email: David.guohui@northcm.ac.th

³North China Electric Power University, Beijing, China.

³Email: shy1130@126.com

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(* Corresponding Author)

Abstract

This study is aimed at exploring the impacts of servant leadership on team innovation performance, examining the role of employee innovative behavior as a mediator and team innovation atmosphere as a moderator. By conducting a questionnaire survey involving 647 employees from the hotel industry and utilizing structural equation modelling for data analysis. Additionally, the study shows that servant leadership significantly improves employees' innovative behavior, which in turn acts as a mediator between servant leadership and team innovation performance. The team innovation climate was identified as a positive moderator reinforcing the link between service-oriented leadership and employee innovation behavior, as well as employee innovation behavior and team innovation performance. This study provides an incisive view of the beneficial impact of service-oriented leadership on team innovation performance, emphasizing the mediating and moderating role played by employee innovation behaviour and team innovation atmosphere. Based on hotel management, the pursuit of timely and effective responses within an intensely competitive market environment is critical to safeguarding the hotel's competitive standing. To address this challenge, the study offers the following recommendations: the foremost emphasis should be on bolstering employees' innovation capabilities. Second, hotel managers are advised to meticulously select, train, and cultivate leaders with a strong service orientation. Thirdly, enterprise leaders should continually elevate their personal knowledge to provide superior guidance to subordinates.

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1. Introduction

The hospitality industry, a global enterprise with a substantial economic value in billions of dollars, plays a vital role in serving millions of people worldwide (Hinkin, 2006). In the Chinese market, the hotel industry holds significant potential for promoting employment and income (Qin, Wen, Ling, Zhou, & Tong, 2014). However, the COVID-19 pandemic has had a significant impact on the environment, creating psychological difficulties for workers, such as depression (Yan et al., 2021). Relevant research has highlighted the intricate relationships among depression, anxiety, and stress. Furthermore, concerns, psychological distress, and financial stress arising from the COVID-19 pandemic have also been shown to influence work performance (Sarfaraz, Ji, Asghar, Ivascu, & Ozturk, 2022).

The continuous evolution and advancement of technology represent a transformative shift in the global business landscape, introducing heightened risks and diminishing the accuracy of market forecasts (Fontana & Musa, 2017). In response, organizations must implement corresponding improvements to solidify and enhance their market position (Scheepers & Storm, 2019). In this context, innovation and adaptation emerge as critical factors for survival and competitiveness (Prasad & Junni, 2016). Leadership is widely recognized as a key determinant of organizational innovation (Alblooshi, Shamsuzzaman, & Haridy, 2021).

During the past few years, there has been a substantial elevation in studies focusing on leadership within the hospitality industry (Elkhwesky, Salem, Ramkissoon, & Castañeda-García, 2022). Various leadership styles exist, with servant leadership standing out as an effective one that contributes to the success of hotels (Brownell, 2010). Specifically, servant leadership centers on addressing employee needs, leveraging the “service” factor, and instilling positive employee behaviors (Melchar & Bosco, 2010; Otero-Neira, Varela-Neira, & Bande, 2016). These aspects have been shown to positively impact productivity and organizational performance (Choudhary, Akhtar, & Zaheer, 2013).

Despite a considerable body of research emphasizing the significance of understanding the underlying mechanisms linking servant leadership to outcomes, there has been limited empirical investigation into the mediating mechanisms (Karatepe, Ozturk, & Kim, 2019). The potential of studies on servant leadership remains largely untapped (Eva, Robin, Sendjaya, Van Dierendonck, & Liden, 2019), and there is a pressing need for more empirical research in this area (Langhof & Guldenberg, 2020). Additionally, recognizing the substantial impact of individual employee behavior on productivity, previous studies have fallen short of efficiently assessing the influence of interventions on individuals’ perceptions of their innovation ability (Hsiao, Chang, Tu, & Chen, 2011). On the one hand, there is a need to explore the determinants of individual innovative behavior (Ng & Lucianetti, 2016). On the other hand, there is a noticeable gap in studies examining the influence of servant leaders on hotel staff performance and behavior (Ling, Lin, & Wu, 2016).

Focusing on the context of the Chinese mainland, the present study relies on the primary academic database in China, namely “CNKI.”¹ However, relevant studies have been limited. Although studies have analyzed the association between innovation atmosphere and employees’ innovative behavior, a certain academic gap exists regarding the cross-level mechanism of team innovation atmosphere on employees’ innovative behavior (Yan, Cui, & Huang, 2019). Based on CNKI search results, research on team innovation atmosphere is centered on mediating variables (Wang, Song, Peng, & Zhang, 2018; Wang, Zhang, & Ye, 2020), whereas research on innovative behavior has predominantly concentrated on dependent variables (Dong, 2023; Li, 2023).

Recognizing the distinctive significance of servant leadership (Bavik, 2020), this study investigates the impact of servant leadership on team performance. Accordingly, this work is aimed at addressing the following questions: First, does employees’ innovative behavior act as an intermediary link between servant leadership and team innovative performance? If so, what is the underlying mechanism driving this connection? Second, does the team innovation atmosphere exert a moderating influence? What is the specific pathway of adjustment? The objective is to contribute to the enrichment of this field of research.

2. Literature Review and Hypotheses

2.1. Servant Leadership and Employee Innovative Behavior

Greenleaf (1970) proposed the concept of servant leadership, which had vital attributes including empowerment, ethical behavior, subordinate growth, and contributions to the community (Ehrhart, 2004; Greenleaf, 1970; Liden, Wayne, Zhao, & Henderson, 2008). Eva et al. (2019) conceptualized servant leadership as a form of other-oriented leadership through one-to-one relationships with followers, aiming to shift the focus from self to others. The incremental value of servant leadership has been underscored relative to other leadership approaches (Hoch, Bommer, Dulebohn, & Wu, 2018; Lemoine, Hartnell, & Leroy, 2019).

Servant leadership focuses on employees’ well-intentioned efforts in creativity, regardless of success, serving as both an encouragement to employees (Lu, Zhang, & Jia, 2019) and a catalyst for service excellence (Li, Liu, Lin, Wei, & Xu, 2021).

Drawing on the regulatory focus theory, research examining the correlation between time pressure and employee innovative behavior has suggested that servant leaders genuinely consider employees’ interests. By actively disseminating developmental information, they facilitate the adoption of a promotion-focused regulatory orientation among employees, encouraging exploratory, innovative behaviors within time constraints (Song, Zhang, & Zhao, 2019).

Empirical analyses have corroborated the positive impact of servant leadership across various dimensions: it promotes employees’ expression of voice (Tan & Liu, 2017) enhances subordinate service performance (Liu, Yu, Qin, & Zheng, 2019; Xu & Wang, 2016). Servant leadership is a positive predictor of employee innovative behavior (Li & Liu, 2020). This leadership style plays a crucial role in stimulating employees’ innovative behaviors (Lan, Qu, & Xia, 2020; Liden et al., 2008; Neubert, Kacmar, Carlson, Chonko, & Roberts, 2008; Wang et al., 2018; Wucui, Guolin, & Dou, 2023), effectively acting as a catalyst for innovative behavior (Iqbal, Latif, & Ahmad, 2020).

¹ CNKI (China National Knowledge Infrastructure) is a leading authoritative knowledge service platform in China.

Hypothesis 1 (H1): Servant leadership significantly positively impacts employee innovative behavior.

2.2. Employee Innovative Behavior and Team Innovative Performance

With the purpose of navigating the challenges posed by Russian neutrality and ensuring effective operation and development, organizations turn to innovation (Fu, Ye, & Xu, 2020). A multitude of studies have investigated the objectives and processes of team innovative behavior (Gray, Knight, & Baer, 2020; Jiang & Chen, 2018; Litchfield, Karakitapoğlu-Aygün, Gumusluoglu, Carter, & Hirst, 2018; Marvel, Wolfe, & Kuratko, 2020).

Innovation, characterized by breaking away from tradition, devising novel methods, and creating value, reflects enhancement and collaboration. Team innovative performance encompasses various forms of innovation, including the introduction of ideas, processes, and products that enhance the efficiency of team cooperation (Shen, Lan, Xiong, Lv, & Jian, 2020; Simonton, West, & Farr, 1992). Evaluating team innovative performance extends beyond considerations of effectiveness and efficiency (Qian, 2009), encompassing management research and team outcomes (Ryu, Neubert, & Gonzalez-Mulé, 2022).

Employee innovation involves the generation, introduction, and the application of innovative ideas by employees to propel organizational progress (Kleysen & Street, 2001). A direct relationship exists between employee engagement and innovative performance, contributing to an organization's competitive advantage (Bessant & Caffyn, 1997). Furthermore, positive correlations exist between employee autonomy and organizational innovation (Cai & Liu, 1998), as well as among individual creativity, organizational innovation mechanisms, and innovative performance (Bharadwaj & Menon, 2000).

Hypothesis 2 (H2): Employee innovative behavior positively impacts team innovative performance.

2.3. Mediating Role of Employee Innovative Behavior between Servant Leadership and Team Innovative Performance

Team innovation involves the introduction and application of novel ideas, procedures, and processes by the team (Ye, Wang, & Guo, 2019). Innovation is extensively considered to be a source of competitive advantage for companies and a catalyst for improved business performance (Jaiswal & Dhar, 2015). Employee innovative behavior encompasses a series of processes within an organization, where individuals generate, adopt, and actualize new ideas (Kleysen & Street, 2001). As the microbasis of innovation, employee innovative behavior has emerged as a decisive factor in the core competitiveness of enterprises (Sacramento, Fay, & West, 2013). In organizational settings, employees play a pivotal role in driving innovation and creativity, and their perception of leadership is instrumental in facilitating this process (Khalili, 2016). It constitutes a crucial component of enterprise innovation activities and an integral part of the management process (Qi, Liu, Wei, & Hu, 2019). The level of support from superiors affects the innovative performance of an organization (Lee & Na, 1994). Leader support for innovation positively influences the attitudes and behaviors of employees toward innovation, thereby enhancing innovative performance (Jing & Zhu, 2017). Servant leadership play a vital role in stimulating employee dedication and positive engagement at work (Carter & Baghurst, 2014). By promoting employee assistance behavior, servant leadership contributes to the enhancement of team innovation, knowledge creation, trust, and overall organizational performance (Chen & Zhou, 2016).

Hypothesis 3 (H3): Employee innovative behavior exerts a mediating role in the relationship between servant leadership and team innovative performance.

2.4. Team Innovation Atmosphere Plays a Positive Moderating Role between Servant Leadership and Employee Innovative Behavior

Van Knippenberg (2017) posited that team innovation can be viewed from the team atmosphere and knowledge integration perspectives, with products and services serving as the ultimate manifestations of innovation (Jiang & Chen, 2018). Amabile (1997) introduced the theory of creative components to elucidate the relation between innovation atmosphere and employee creativity. This theory highlights the promotion of creativity through components in the work environment, in addition to the purpose and processes associated with creativity. Previous research has supported the idea that the work environment impacts creativity (Oldham & Cummings, 1996; Woodman, Sawyer, & Griffin, 1993) and the organizational atmosphere plays a significant role in innovation (Pörzse et al., 2012). Furthermore, it serves as an essential resource for influencing innovative behavior (Ren & Zhang, 2015). Employees are more likely to be engaged in innovative behavior when they perceive their work environment as supportive, flexible, and conducive to information-sharing, coupled with recognition and rewards for their efforts (Amabile, 2013; Amabile, Conti, Coon, Lazenby, & Herron, 1996). Simultaneously, the relation between organizational resources and innovation is constrained by the atmosphere of innovation (Hosseini, Azar, & Rostamy, 2003), and the correlation between leadership empowerment and management innovation is influenced by the atmosphere of creation (Hassi, 2019). The innovation atmosphere can positively moderate the correlation between servant leadership and innovative behavior.

Hypothesis 4 (H4): Team innovation atmosphere plays a positive moderating role in the relation between servant leadership and employee innovative behavior.

2.5. The Positive Moderating Effect of Team Innovation Atmosphere on Employee Innovative Behavior and Team Innovative Performance

The collective perception of the innovation environment and atmosphere by team members (Fang, Shi, & Liu, 2012) holds profound significance. Notably, this perception is a shared perspective among individuals within the team (Liu & Sun, 2018). This collective viewpoint arises from a team's individual exploration of its innovative potential and the cultivation of innovative capabilities, intertwined with the psychological understanding of the team's environmental dynamics (Zheng & Jin, 2009). The environment plays a pivotal role in influencing people's behavior, allowing them to respond accordingly (Bäckström & Bengtsson, 2019; Maqbool, Černe, & Bortoluzzi, 2019). A positive team atmosphere enhances member interaction, and the correlation between interaction and innovation is notable, particularly in facilitating changes in employees' innovative behavior (Hurmelinna-Laukkanen, Atta-Owusu, & Oikarinen, 2016). An innovative atmosphere promotes the generation of new products, ideas, or processes among employees (Beh, 2019). A positive innovation atmosphere prompts employees to seek new initiatives and pose novel questions (Sica, Ragozini, Di Palma, & Aleni Sestito, 2019; Sönmez & Yildırım, 2019). Noteworthy research by Yang, Hou, and Deng (2015) highlighted that the innovation atmosphere effectively moderates the positive correlation between member diversity and team openness.

Empirical investigations have consistently underscored the profound impact of team atmosphere on team performance (Liu, Xie, & Meng, 2011). Moreover, the climate of organizational trust possesses the potential to influence organizational performance by shaping individual knowledge-sharing behavior, either directly or indirectly (Wang, Lin, Chen, & Bai, 2014).

Hypothesis 5 (H5): Team innovation atmosphere exerts a positive moderating role in the relation between employee innovative behavior and team innovative performance.

Therefore, the current work develops a model based on the research objectives and assumptions, considering Process Model 58. Figure 1 displays the specific model.

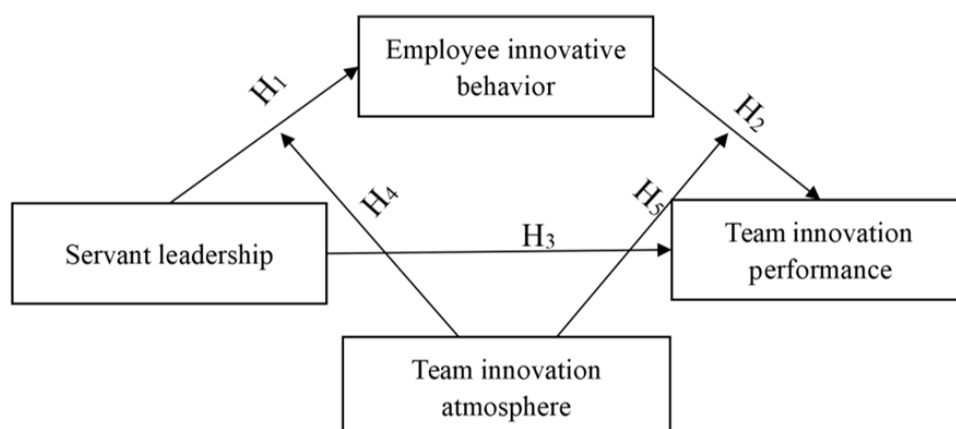


Figure 1. Research hypothesis diagram.

3. Research Methods and Scale Refinement

3.1. Research Method

For evaluating servant leadership, the definition and measurement criteria proposed by Sun and Wang (2010) were utilized, with some adjustments made to meet specific requirements. Accordingly, 350 managers and employees in Beijing were interviewed. The reliability range of the scale is commendable, ranging between 0.66 and 0.87. In addition, the questionnaire on servant leadership demonstrated structural validity and robustness.

To evaluate employee innovative behavior, Xu (2014) revised the scale. The reliability score of this scale was 0.848, implying high reliability.

The Team Climate Inventory Scale, improved by Ling (2003), was used to capture the team innovation atmosphere, encompassing long-term goals, innovation support, task orientation, and interaction frequency. The scale demonstrated satisfactory semi-reliability (0.8355) and consistency-reliability coefficients (0.9406).

In order to measure team innovative performance, the scale developed by Zhang (2010) was adopted, demonstrating an impressive overall reliability score of 0.904.

The study included five hotels in Chengdu owned by the same Chinese hotel group, with a total of 1,231 employees. The Taro Yamane formula was used to find the minimum sample size needed for June 2023. It was 302 ($n = N / (1 + N(e^{-2}))$) according to the formula, $S_n = (n/N) * N_i$, where S_n is the number of samples in each layer, n is the total sample size, N is the total population, and N_i is the number of units in each layer. Minimum sample needed for each hotel was determined. An online questionnaire, utilizing Likert scales ranging from "1" (strongly disagree) to "7" (strongly agree), was distributed randomly in each hotel to facilitate data collection.

3.2. Scale Revision and Compilation

3.2.1. Participant Profile

To enhance the scale's applicability to our research context, revisions were made following an analysis of 311 survey responses collected from within the designated research scope. Table 1 shows the fundamental features of the participants.

Table 1. Basic information of participants.

Name	Options	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Male	195	62.70	62.70
	Female	116	37.30	100.00
Education level	High school and below	42	13.50	13.50
	College or undergraduate	162	52.09	65.59
	Master degree and above	107	34.41	100.00
Age	18~30 years old	59	18.97	18.97
	31~50 years old	252	81.03	100.00
Total		311	100.0	100.0

3.2.2. Scale Reliability Assessment

3.2.2.1. Evaluation of Cronbach's α Coefficient

The reliability evaluation of the scale hinges on the significance of the Cronbach's α coefficient, a pivotal metric for assessing the consistency of the scale and the reliability of the measurement. Traditionally ranging from 0 to 1, Cronbach's α exerts an essential role in ensuring the reliability of the collected data. A value close to 0 suggests reduced reliability, indicating that the scale's measurement lacks a robust foundation, raising concerns about the integrity of the collected data. As per the insights from DeVellis and Thorpe (2021), a Cronbach's α coefficient exceeding 0.70 indicates strong exponential consistency among the scale components, implying high reliability. Conversely, a reliability factor falling below 0.60 raises questions about compliance, warranting scrutiny of the scale's appropriateness or a reassessment of the selection criteria for survey participants.

3.2.2.2. Findings and Implications

Following a meticulous scrutiny of the reliability of each individual scale item, a consistent and robust pattern emerged: Cronbach's α coefficients for each variable and their respective dimensions surpassed the commendable threshold of 0.80. Specific values of reliability coefficients for each variable are presented in Table 2. This resounding pattern attests to the stability and reliability of the selected classic scale within the confines of this survey, reaffirming participants' earnest engagement with the questionnaire. The data accrued from questionnaire responses for all four variables serves as a testament to the high credibility and reliability of the measurements. This affirmation can be duly substantiated through diligent investigation and retrieval endeavors. This sturdy underpinning of reliable data inherently lays the groundwork for ensuing research and analytical ventures.

Table 2. Reliability analysis.

Variable	Number of items	Cronbach's alpha coefficient
Persuasion guide	3	0.862
Altruism	2	0.816
Wisdom	2	0.748
Social responsibility	2	0.886
Servant leadership total score	9	0.912
Generation of ideas	3	0.908
Execution of ideas	3	0.916
The total score of employee innovation behavior	6	0.894
Innovation support	3	0.965
Task oriented	2	0.895
Interaction frequency	2	0.779
Team innovation atmosphere total score	7	0.916
Team innovation performance total score	7	0.852

3.2.3. Validity Evaluation

3.2.3.1. Exploring Validity via EFA

The application of exploratory factor analysis plays a crucial role in the validity evaluation, serving as a key stage in the research process. The Kaiser-Meyer-Olkin (KMO) values are presented: 0.878 for servant leadership, 0.863 for team innovation atmosphere, 0.837 for employee innovative behavior, and 0.878 for team

innovative performance. Notably, the combined KMO values for all four variables exceeded the threshold of 0.8, suggesting their robust validity. In other words, the combined KMO values suggest that research data are highly suitable for extracting insightful information.

3.2.3.2. Convergent Validity Analysis

Convergence effectiveness is rigorously assessed through the average variance extraction (AVE) method, an extensively recognized technique in the academic community (Hair, Risher, Sarstedt, & Ringle, 2019). AVE investigates the contribution of the constituent dimension of a potential variable to the total variation. An AVE value greater than 0.50 suggests good convergent validity. The results of an AVE analysis are as follows:

- Servant leadership: 0.60–0.80
- Team innovative atmosphere: 0.64–0.90
- Employee innovative behavior: 0.77–0.78
- Team innovative performance: 0.5

In this study, all AVE values easily exceeded the critical threshold of 0.50, indicating not only a substantial amount of variance in the structural framework but also robust convergence effectiveness.

The collective results of the reliability and validity assessments demonstrated that the data were appropriate for the subsequent data analysis phase.

4. Data Collection and Hypothesis Testing

In August 2023, the online survey platform “Questionnaire Star” was employed to facilitate the collection of official receipts. The participant pool comprised 647 employees, encompassing 407 men and 240 women.

4.1. Basic Information of the Participants

The current section offers an overview of the participants’ basic demographic information (Table 3 displays the details).

Table 3. Basic information of the participants.

Name	Options	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Male	407	62.9	62.9
	Female	240	37.1	100.0
Education level	High school and below	55	8.5	8.5
	College or undergraduate	365	56.4	64.9
	Master degree and above	227	35.1	100.0
Age	18~30 years old	123	19.0	19.0
	31~50 years old	524	81.0	100.0
Total		647	100.0	100.0

4.2. Measuring Tools

This study encompassed four different scales: servant leadership, team innovative performance, employee innovative behavior, and innovation atmosphere. Each scale constituted a crucial component of the research framework. The reliability statistics for each scale and its corresponding dimensions are shown in Table 4.

Table 4. Reliability of each variable and dimension.

Variable	Number of items	Cronbach's alpha coefficient
Persuasion guide	3	0.742
Altruism	2	0.700
Wisdom	2	0.647
Social responsibility	2	0.794
Servant leadership total score	9	0.870
Generation of ideas	3	0.908
Execution of ideas	3	0.923
The total score of employee innovation behavior	6	0.948
Innovation support	3	0.851
Task oriented	2	0.827
Interaction frequency	2	0.690
Team innovation atmosphere total score	7	0.920
Team innovation performance total score	7	0.800

4.3. Analysis of the Mediating Role of Employee Innovative Behavior in the Relation Between Servant Leadership and Team Innovative Performance

This section discusses the intricate dynamics among servant leadership, employee innovative behavior, and team innovative performance. The AMOS 23.0 software was used to build a strong structural equation model by looking into the possible mediating role of innovative employee behavior in great detail.

The entire spectrum of variables within the model successfully adhered to the criteria for a normal distribution. According to the maximum likelihood method, parameter estimation was facilitated.

Evaluating the research model's appropriateness involved a meticulous assessment of different key metrics. Apparently, the chi-square degree of freedom ratio (χ^2/df), goodness-of-fit index (GFI), standardized residual means square and square root (SRMR), asymptotic residual square error of approximation (RMSEA), normed fit index (NFI),² incremental fit index (IFI), Tucker-Lewis Index (TLI), comparative fit index (CFI), parsimony goodness-of-fit index (PGFI), and parsimony-adjusted NFI (PNFI)³ were beneficial for the assessment of the model's alignment according to the empirical data. The specific situation is presented in Figure 2.

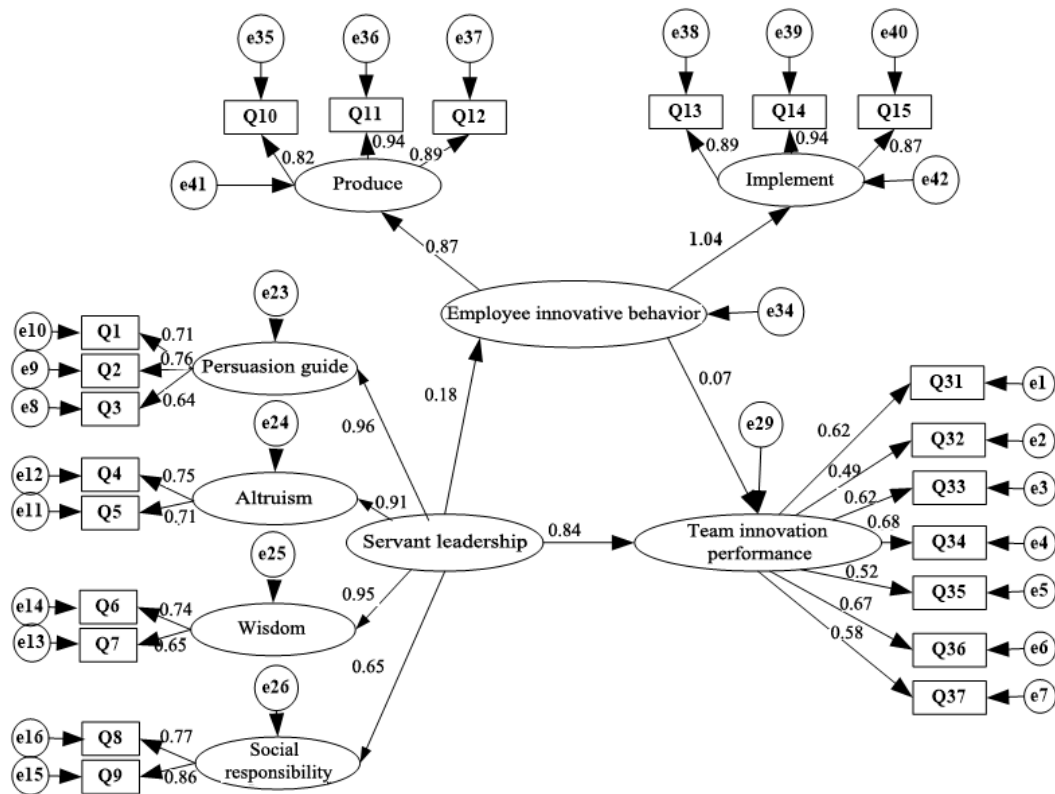


Figure 2. Mediation effect model.

Examining Table 5, it is evident that each fitting index within this model attained favorable results. This positive outcome implies the congruence of the model with the empirical data, setting the stage for the subsequent stages of analysis.

Table 5. Model fitting indicators and reference values.

Index	Test result	Guideline
χ^2	803.240	-
Df	200	-
χ^2 / df	4.016	< 5
CFI	0.924	> 0.9
IFI	0.924	> 0.9
TLI	0.912	> 0.9
NFI	0.949	> 0.9
RMSEA	0.068 (0.063-0.073)	< 0.08

² NFI (Normed Fit Index) is a fit index in structural equation models with values typically ranging between zero and one.

³ PNFI (Parsimonious Normed Fit Index) is a fit index in structural equation models with values typically ranging between 0 and 1 PNFI is a fit index that takes into account the complexity of the model. A higher PNFI value usually indicates that the model is both a good fit and relatively more concise.

The outcomes of the path analysis, as delineated in Table 6, yield insightful revelations. First, servant leadership significantly positively influenced team innovative performance (standardized coefficient = 0.84, $P < 0.001$). Second, the effect of servant leadership significantly extended to employee innovative behavior, with a positive coefficient of 0.18 ($P < 0.001$). Third, the standardized coefficient of 0.07 ($P < 0.05$) demonstrates that employee innovative behavior significantly positively impacted team innovative performance.

Table 6. Normalized path coefficients.

Paths	Estimate	SE	CR	P
Employee innovative behavior <--- Servant leadership	0.177	0.071	3.621	***
Team innovation performance <---Employee innovative behavior	0.065	0.022	2.024	0.043
Team innovation performance <--- Servant leadership	0.840	0.070	11.931	***

Note: SE: Standard error; CR: Critical ratio. *** $p < 0.001$.

Perhaps, most obviously, this analysis underscores the pivotal role of employee innovative behavior, highlighting its role in mediating the association between servant leadership and team innovative performance.

4.4. Moderating Effect of Team Innovation Atmosphere in the Relationship between Servant Leadership and Employee Innovative Behavior and Employee Innovative Behavior and Team Innovative Performance

With the aim of testing the moderated mediation effect model, the process in SPSS was adopted. This model is categorized into two types of regression models. When the dependent variable is Y, the first type is constructed, whereas the second type is constructed when the dependent variable is the mediating variable M (if multiple mediating variables result in multiple models). This model is aimed at examining the moderating impact of atmosphere on servant leadership, innovative behavior, and innovative performance. Accordingly, Model 58 was selected for analysis.

According to Table 7, when innovative performance was used as the dependent variable, the interaction term of employee innovative behavior and innovation atmosphere was significant. Thus, innovation atmosphere made an obvious moderating impact on employee innovative behavior and innovative performance. When innovative performance was used as the dependent variable, a significant impact was observed on servant leadership and innovation atmosphere.

Table 7. Regression model summary table.

Variable	Team innovation performance				Employee innovative behavior			
	β	SE	t value	p value	β	SE	t value	p value
Constant	21.12	3.15	6.71	0.00***	40.21	5.60	7.18	0.00***
Servant leadership	0.50	0.02	23.33	0.00***	-0.41	0.22	-1.87	0.06
Innovative atmosphere	-0.39	0.07	-5.24	0.00***	-0.50	0.14	-3.66	0.00***
Servant leadership*innovative atmosphere					0.02	0.01	2.93	0.00**
Employee innovative behavior	-0.59	0.10	-5.99	0.00***				
Employee innovative behavior*innovative atmosphere	0.02	0.00	6.80	0.00***				
Sample size	647				647			
R^2	0.53				0.05			
Adjust R^2	0.53				0.05			
F value	$F(4,642) = 183.34, p = 0.00$				$F(3,643) = 11.80, p = 0.00$			

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

Table 8. Conditional indirect effect results.

Mediating variable	Level	Level value	Effect	BootSE	BootLLCI	BootULCI
Employee innovative behavior	Low level (-1 SD)	31.64	-0.01	0.01	-0.02	0.01
	Average value	39.63	0.01	0.00	0.00	0.02
	High level (+1SD)	47.63	0.06	0.02	0.03	0.09

Note: BootLLCI (Bootstrap Lower Level Confidence Interval) indicates the lower limit of the 95% interval of Bootstrap sampling; BootULCI (Bootstrap Upper Level Confidence Interval) indicates the upper limit of the 95% interval of Bootstrap sampling; bootstrap type: percentile bootstrap method. SD: Standard deviation.

A moderated mediation effect analysis was carried out on Model 58. The boot 95% CI⁴ involved the number 0, with the mediating variable of employee innovative behavior being at a low level. This suggests the absence of a mediating effect at this level. In addition, at an average level, the number 0 was not included in the boot 95% CI, implying the existence of an intermediary effect at this level, with an effect value of 0.011.

⁴ A confidence interval (CI) is a range that we can claim with a certain level of confidence (e.g., 95%) that this interval includes an unknown parameter (e.g., the population mean).

Based on high-level conditions, the boot 95% CI could also exclude the number 0, indicating a mediating effect at the current level, with an effect size of 0.061. Table 8 displays that the mediating effect varied across levels, demonstrating a moderating mediating effect.

The results of the moderated mediation index are shown in Table 9. This table shows the index and the result values that are related to bootstrapping. There are two ways to assess whether moderated mediation exists. The first approach involves examining the effect at different levels to compare the significance of the value. The second approach involves verifying the significance of the index value. SPSSAU⁵ provides the aforementioned judgment methods, and the test principle for both methods is similar. If the mediating effect of adjustment is not obvious, the conclusions of the two methods may not be completely consistent. Third, if Boot LLCI and Boot ULCI do not contain the number 0, then they are considered significant, implying that they play an intermediary role. The results indicated that Boot LLCI and Boot ULCI did not contain the number 0. Therefore, the team innovation atmosphere had a moderating impact on the relationship between innovative behavior and innovative performance, as well as between servant leadership and innovative performance.

Table 9. Adjusted intermediary index.

Variable	Team innovation performance				Employee innovative behavior			
	B	SE	t value	p value	β	SE	t value	p value
Constant	21.12	3.15	6.71	0.00***	40.21	5.60	7.18	0.00***
Servant leadership	0.50	0.02	23.33	0.00***	-0.41	0.22	-1.87	0.06
Innovative atmosphere	-0.39	0.07	-5.24	0.00***	-0.50	0.14	-3.66	0.00***
Servant leadership*innovative atmosphere					0.02	0.01	2.93	0.00**
Employee innovative behavior	-0.59	0.10	-5.99	0.00***				
Employee innovative behavior*innovative atmosphere	0.02	0.00	6.80	0.00***				
Sample size	647				647			
R ²	0.53				0.05			
Adjust R ²	0.53				0.05			
F value	F(4,642) = 183.34, p = 0.00				F(3,643) = 11.80, p = 0.00			

Note: * p < 0.05 ** p < 0.01 *** p < 0.001.

5. Conclusions and Recommendations

5.1. Conclusions

To conclude, the present study focuses on investigating the association between servant leadership and team innovation. During this process, the mediating mechanism of employee innovative behavior and the moderating effect of the team innovation atmosphere have been thoroughly examined. The results are compelling, highlighting several noteworthy relationships. First, it clearly confirmed Hypothesis 1 by establishing that servant leadership positively impacted employees' innovative behavior. Second, this study confirmed Hypothesis 2 by revealing a significant positive correlation between employee innovative behavior and team innovative performance. The study also found a key link between employees' innovative behavior when they are led by a servant and the team's overall innovation performance, which supported Hypothesis 3. In addition, hypotheses 4 and 5 were empirically supported. Team innovation atmosphere played a constructive role in shaping the complex connections between servant leadership and employee innovative behavior, as well as between employee innovative behavior and team innovative performance.

5.2. Research Proposals

In the context of hotel management, the pursuit of timely and effective responses within an intensely competitive market environment is critical to safeguarding a hotel's competitive standing. To address this challenge, this study offers the following recommendations:

Elevate Employee Innovation Capabilities: The foremost emphasis should be on bolstering employees' innovative capabilities. Organizations can foster conducive working conditions that can instill a sense of value in the organization, thereby enhancing employees' intrinsic motivation toward their tasks (Ho, Wong, & Lee, 2011). Cultivating a supportive work environment in which employees feel comfortable expressing their needs and receiving independent support nurtures a culture of harmony and enthusiasm (Trépanier, Fernet, Austin, Forest, & Vallerand, 2014). For hotels, this extends beyond solely catering to guests and towards creating a nurturing environment that encourages personal growth, reward, and respect toward staff (King, 1995). This ethos naturally extends from staff to guests, consequently heightening the competitive edge of the enterprise. Furthermore, organizations should provide constructive feedback to employees, propelling them toward their objectives and igniting motivation for wholehearted engagement in their roles.

⁵ SPSSAU is an online statistical tool.

Foster servant leadership: Hotel managers should meticulously select, train, and cultivate leaders with a strong service orientation. Modern professionals in the hotel industry, particularly millennials, emphasize their relationship with supervisors (Chen & Choi, 2008). Therefore, hotel managers should adopt targeted selection processes and provide consistent training to nurture service-focused leadership that cultivates a culture of exceptional service delivery. Empirical evidence has underscored the role of servant leadership behaviors in nurturing employees' psychological safety (Edmondson, 1999) and fostering their job satisfaction (Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005), thereby stimulating employee engagement in innovative endeavors. Accordingly, in an increasingly competitive business landscape, servant leaders have become indispensable. This leadership approach, characterized by its emphasis on prioritizing others' needs and welfare (Ehrhart, 2004), impels employees to serve (Ehrhart, 2004). This approach fosters an environment conducive to excellence (Walumbwa, Hartnell, & Oke, 2010). This dynamic, in turn, equips employees with the resources they seek, ignites their harmonious passion, and culminates in noteworthy accomplishments (Astakhova, 2015). Such leadership can potentially amplify the performance of hotel personnel in proactive customer service, characterized by spontaneous, enduring, and customer-centric behavior (Rank, Carsten, Unger, & Spector, 2007).

Heighten Leader Knowledge and Guidance: Enterprise leaders should continually elevate their personal knowledge to provide superior guidance to subordinates. With regard to employees, servant leadership can enhance learning and job satisfaction (Cerit, 2009). Employees emulate leaders as positive role models (Russell, 2001), seeking to outdo their behavior. Knowledgeable leaders command greater respect from employees (Verdorfer, 2019), serving as an additional wellspring of motivation for the workforce.

By embracing these recommendations, hotel management can adeptly navigate the competitive market environment, fortify their competitive stance, and propel their business toward sustained success.

5.3. Research Limitations

First, the scope of the present study is firmly rooted in the unique landscape of the hotel industry in Chengdu, China. In addition, the lack of cross-cultural, cross-regional, and cross-industry exploration raises the possibility of a lack of universal applicability of the study results. With the purpose of enhancing the breadth and depth of future research endeavors, extending the scope of the survey is highly recommended. This may involve covering diverse fields and regions, potentially extending the study to non-commercial environments, including government organizations.

Furthermore, this study only considers employee innovative behavior as a mediating variable. Further studies should include other potential mediating factors, including climate change or knowledge access, to foster a more thorough and nuanced comprehension of the intricate interconnections. Moreover, this multidimensional perspective promises to unlock a more complex and dynamic description.

This study relies only on online data collection technology. Moreover, the future studies should use diverse and multifaceted data collection strategies with the aim of strengthening the credibility and objectivity of the findings.

Based on the above suggestions, future research work can break through the limitations with a wider range of mediating variables and more robust data collection methods, providing further insights for further research on servant leadership.

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