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Open innovation's mediating role in shared leadership and employee innovation

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Abstract
Purpose: Over the past two decades, China's Internet Services has undergone multiple waves of change and now generates more than $1,004,4B in monthly Revenue. Gaining a competitive edge in the China's Internet Services requires innovation. Despite China's economic might and the importance of the sector to the economy, the sector confronts innovative hurdles as a result of weak cooperation, communication, and shared goals. This study focused on "open innovation's mediating role in shared leadership and employee innovation".
Design/methodology/approach: A quantitative and deductive cross-sectional design with validated questionnaires was used in the study to survey 185 top, middle, and lower-level employees of China's Internet services due to the companies' prominence and status as private enterprises in the economy. The partial least squares was used to analyzed the collected data.
Findings: The results of the study showed that shared leadership has a positive effect on employee innovation and that open innovation mediates the relationship between the shared leadership and employee innovation.
Research limitations/implications: The limitation was the way to get a large sample size. In this study, a total of 185 responses were successfully collected from China's Internet Services. However, this number of collections was not representative of the whole population of the sector.
Practical implications: The study's findings will help shareholders, managers, and the government comprehend what makes great employee innovation possible and how it contributes to the long-term sustainability of their business.
Originality/value: In order to maintain employee innovation within the sector, the report advocates continual best practices and suggests encouraging shared leadership, and open innovation as crucial tactics.

Keywords: employee innovation, innovation performance, open innovation, and shared leadership.

Introduction

Due to the growing complexity of the issues encountered by China's Internet Services in the digital era, this sector in China has undergone multiple rounds of liberalization and privatization-related reforms over the last thirty years (Xu *et al*., 2023). Consequently, they are exerting significant efforts to prevent being reduced to mere data conduits in this digital age (Yu *et al*., 2017). In the realm of China's Internet Services sector, fostering employee

innovation is imperative because innovation plays a vital role in facilitating business growth and enabling companies to distinguish their products and services from those of their competitors (Zhao, 2021). However, the sector in China has predominantly prioritized the maintenance of day-to-day operations over fostering innovation (Alassaf *et al*., 2020).

The primary barriers that hinder individuals from actively participating in the era of innovation typically revolve around limitations, such as financial constraints and time constraints (Jimoh, 2022). Given that innovation has a profound impact on both performance and employment, the concern regarding China's lagging innovation rate in comparison to other countries becomes especially pertinent (Shi, 2022). Innovation stands as a substantial driver of performance, exerting the most significant influence on overall productivity and employment growth (Chesbrough, 2020).

Given this context, it is crucial to acknowledge the significance of innovation for organizations. It is high time we paid more attention to teams with shared leadership (Beyene *et al*., 2016). Both individual and corporate-level innovation has been receiving increasing focus, and because "teams can be fertile grounds for creativity and innovation," there is an urgent need for research on shared leadership (Currie *et al*., 2019). Globally, multinational corporations are successfully navigating today's complex, dynamic, and competitive business landscapes by relying on shared leadership as a fundamental element for promoting employee innovation and gaining a competitive edge over rivals (Bratianu, 2022).

There is evidence that shared leadership brings several benefits to businesses. Moreover, as per Berraies *et al*. (2021), shared leadership reduces employee turnover rates because it maximizes ideas, minimizes bottlenecks, resulting in improved employee productivity and innovation, and reduced production or processing times. However, there are limited empirical studies, as pointed out by Cheng *et al*. (2018), Odebunmi *et al*. (2021), and Xu *et al*. (2023), examining these connections, as well as the personal and environmental factors that influence these outcomes.

To comprehend the prerequisites for establishing a successful shared leadership environment, additional education is often necessary. Currently, there is limited understanding of how individuals behave in shared leadership settings, particularly in terms of fostering employee creativity and providing constructive criticism that supports effective shared leadership. Shared leadership, which encourages and facilitates individual initiative, has a positive impact on an organization's functioning (Jimoh *et al*., 2017). Performance and innovative ideas tend to flourish when employees are encouraged to act on their own insights and initiatives rather than waiting for directives (Berraies *et al*., 2021).

The concept that the most intelligent organizations are those where the smartest individuals have the authority to oversee the work of others underpins the structure of many organizations (Jimoh & Kee, 2022). The digital revolution has given rise to a new management model where it is assumed that the most intelligent organizations have easy access to collective knowledge. Sharing knowledge can foster team cohesion and the generation of innovative ideas (Shi, 2022). Employees possess a wealth of knowledge, which benefits both the company and their colleagues (Odebunmi *et al*., 2021). When people share knowledge, they establish better connections, perform more effectively, and cultivate more successful careers (Beyene *et al*., 2016). This shared knowledge can also be harnessed for the development of policies, planning, and streamlining procedures. As a result, the sector can rely on its workforce to consistently perform their tasks effectively and produce high-quality work.

While many studies have recognized the potential of open innovation, recent research appears to predominantly concentrate on the direct link between open innovation and employee innovation (Chiang & Hung, 2010; Xu *et al*., 2023). Consequently, it seems that the full potential of open innovation has not been fully realized (Cheng & Shiu, 2015; Zhou *et al*., 2018). It is suggested that the relationship between open innovation and employee innovation

may not be solely direct, and other organizational factors could come into play. Therefore, to foster a culture of innovation in China's Internet Services, a more comprehensive body of research on employee innovation is essential. Identifying facilitators of employee innovation and analyzing mediating factors that sustain such relationships is necessary to further promote innovation. In the light of that, the study aims to examine the effect of shared leadership on employee innovation in the China's internet services and mediating effect of open innovation on the relationship between shared leadership and employee innovation in the China's Internet Services.

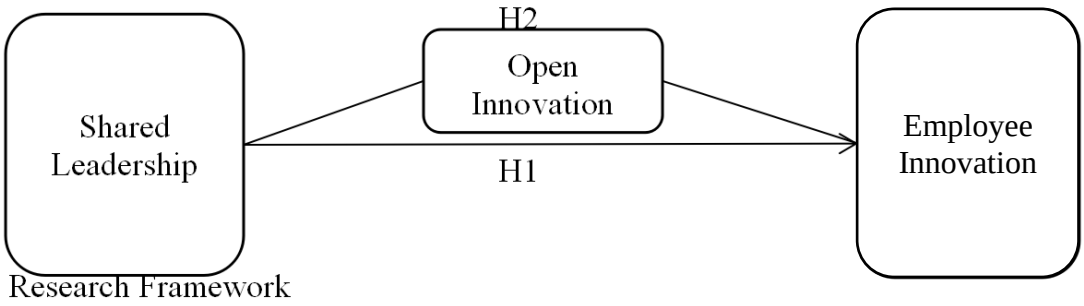
Literature Review

Diffusion of Innovations (DOI)

The concept of Diffusion of Innovation (DOI) is a widely accepted framework in the study of innovation. According to this notion, diffusion occurs when individuals become part of a social system that embraces a new concept, practice, or item (Rogers, 2010). DOI can be divided into two main categories: innovation and diffusion. Innovation is defined as the adoption of novelty and a shift in one's mindset or a group's behavior. It takes place when individuals or organizations subjectively perceive or accept something as "new" and make changes accordingly. On the other hand, diffusion is the process of spreading an idea rapidly within a social system. Individuals or groups disseminate innovation through their social networks, using established channels to reach a certain level of consensus. In essence, diffusion is the mechanism for distributing innovation among members of a social system through specific channels, encompassing new products, applications, technologies, and ideas (Akça & Zer, 2014).

In this study, both open innovation and employee innovation were examined through the lens of the Diffusion of Innovation (DOI) framework. DOI was utilized to gain a better understanding of how people transform new concepts into practical applications. According to the DOI hypothesis (Rogers, 2010), various factors such as communication, individual decision-making styles, potential outcomes, and innovative attributes play a role in determining the speed of adoption of an innovation. Rogers suggests that the adoption of innovation is influenced by the characteristics of individuals or groups and that this process is inherently complex. For instance, there is evidence to suggest that shared leadership and knowledge exchange can be mediated by open innovation to enhance employee innovation. Through regular open innovation practices, communication with others to exchange knowledge, ideas, and experiences can facilitate the dissemination of fresh and innovative ideas. DOI provides a useful framework for understanding how these complex processes of innovation and diffusion occur within organizations (Jimoh *et al*., 2023b).

The mediation role in the present study is elucidated through the lens of the DOI theory. DOI theory is employed because it effectively encompasses the key characteristics of innovation that are believed to be significant, including relative advantage, complexity, compatibility, trialability, and observability (Akça and Zer, 2014). These characteristics are influential in shaping individuals' and organizations' intentions, thereby significantly facilitating the adoption of innovation and ultimately enhancing employee innovation performance within the Chinese internet service sector. DOI theory provides a robust framework for understanding how these attributes influence the innovation process and its outcomes in this industry.



Research Framework

Hypotheses Development

Relationship between shared leadership and employee innovation

According to Hoch (2013), he think that giving employees access to shared leadership will encourage them to act in more creative ways. According to Lu et al. (2006), shared leadership is a team process in which worker leadership is executed collaboratively as opposed to being the exclusive domain of one designated individual. Shared leadership encourages team members to work together, exchange knowledge, and come up with ideas as a group (Hoch, 2013). According to Jimoh *et al*. (2017), shared leadership is a critical team characteristic that influences sharing behaviors across multiple employees. Alassaf *et al.* (2020) further describe shared leadership as a method for distributing responsibility for planning and its execution to achieve better performance.

Workers who are allowed the freedom to take the lead and collaborate with their peers in making decisions, solving problems, and seeing opportunities for the future are more likely to exhibit creativity and innovation (Jimoh et al., 2023a; Jimoh et al., 2017 & Odebunmi et al., 2020). While most studies have focused on the team level to explain shared leadership as a collective phenomenon within teams, this results in "multiple employees likely performing specific leadership functions" (Morgeson *et al.*, 2010). Alassaf *et al.* (2020) view shared leadership as synonymous with effective teamwork, information exchange, and staff collaboration. According to the theory proposed by Berraies *et al*. (2021), shared leadership enhances an organization's operational efficiency while simultaneously fostering employee innovation. In line with this finding, Edelbroek *et al*. (2023) discovered that shared leadership teams experience lower levels of conflict, increased consensus, higher levels of trust and cohesion, and generate more creative ideas. In light of this, we propose the following hypothesis to investigate the impact of shared leadership on employee innovation in the China's service sector:

H1: there is a positive relationship between shared leadership and employee innovation

Mediating role of open innovation on shared leadership and employee innovation

Employee innovation is a critical driver that provides companies with a competitive advantage and enhances their overall performance. In today's rapidly changing market, all organizations, regardless of their size or sector, are compelled to prioritize innovation to retain their relevance and survival. The continuous ability of an organization to innovate significantly contributes to both economic growth and innovation performance. Researchers are increasingly focusing on the factors and processes that facilitate the collection and management of knowledge, as collaboration among enterprises and an open approach to innovation become more prevalent (Lu *et al*., 2020; Papa *et al*., 2018; Tian *et al*., 2020).

Open innovation has gained significant popularity in this fiercely competitive era. Innovation, as a broad concept, encompasses various forms with diverse concepts and interpretations. To manage and promote technological advancement, a new paradigm called "open innovation"

was introduced in 2003 (Chesbrough, 2006a). Open innovation, according to Chesbrough (2006a), is the intentional flow of information in both directions to promote innovation within an organization and increase its use outside of it. Previous studies have shown that there is a positive relationship between employee innovation and open innovation; these studies include Brunswicker et al. (2018), Zhou et al. (2018), and Bratianu et al. (2022).

Moreover, Mohammed *et al*. (2023), along with other researchers, have identified a strong and favorable association between shared leadership and employee innovation. However, Berraies (2021) and Edelbroek (2023) found a weak and unfavorable relationship between shared leadership and employee innovation, respectively. Given these findings, the decision to explore open innovation as a mediating factor between shared leadership and employee innovation was influenced. According to Baron and Kenny (1986), mediating variables are often necessary to explain how specific variables, such as open innovation, influence the outcomes of shared leadership and employee innovation. Therefore, the study formulates the following research hypothesis:
H2: open innovation mediates the relationship between shared leadership and employee innovation

Method
The foundational approach for this study, which seeks to explore the impact of shared leadership and employee innovation, is rooted in the positivist paradigm. The positivist paradigm advocates for the utilization of observational data, statistical analysis, and empirical research. Given the cross-sectional nature of the study, all research variables was measured simultaneously (Sekaran & Bougie, 2016). The study's 1766 population consists of top, middle, and lower-level employees within the Chinese internet service sector. Convenience sampling is employed to select research participants, as they are easily accessible and willing to participate in the study at any given time. To determine both the required and actual sample sizes for the study, the GPower software was employed. Gpower is a comprehensive tool for conducting independent power analysis in statistical testing.
For this study, a minimum sample size of 107 was established. Data from respondents were collected through an online Google Forms survey, making it convenient for participants to complete the survey electronically. The questionnaire utilized in this study drew questions from existing research. For assessing shared leadership, an eight-item assessment was adapted from Hoch et al. (2010). To evaluate open innovation, seven evaluation criteria were adapted from Cheng and Shiu (2015). Eight items from Verbano and Crema (2016). Data gotten from the respondents were analyzed through PLS-SEM.

Findings
In accordance with the minimum sample size calculated, a total of 107 questionnaire was distributed to workers in the sector who had consented to participate in the study. This was done to ensure an adequate response rate. Data collection commenced in January 2022 and concluded in April 2023. It is worth noting that no survey can generate an exact result (Mathers *et al*., 2007). However, the response rate for this study is considered to be quite good. Out of the 177 questionnaires distributed, 176 were returned, resulting in an 99% response rate. Only 1 questionnaire was excluded due to insufficient data.
Sekaran and Bougie (2016) state that a mean score of latent variables is low if it is less than or equal to 1.99, moderate if it is between 2.00 and 3.99, and high if it is 4.00 or higher. The study's variables were measured using a five-point Likert scale. Therefore, a score of Share leadership (M = 4.545, SD = 1.674) and open innovation (M = 4.346, SD = 1.673) recorded a

high score, while employee innovation (M = 3.675, SD = 0.972) showed moderate scores above the mid-point score, which also indicated that both variables were crucial for the study.

Table 1: Mean Value and Standard Deviation of Latent Constructs

Study Variables	Mean	Standard Deviation
Share leadership	4.545	1.674
Open Innovation	4.346	1.673
Employee Innovation	3.675	0.972

The loading of items, AVE, and composite reliability of the measurement are presented in Table 2 below. According to Hair, *et al*. (2010, 2014), all AVE values must be greater than 0.5 when evaluating the reliability of the variables. Items with exterior loadings lower than 0.5 must also be taken out. Table 2 demonstrates that the AVE for each component was greater than 0.50. This suggests that there was good convergence validity in the measurement used in the study. Furthermore, the analysis also tests the composite reliability of the study, as shown in Table 2. According to Hair et al. (2016), the composite dependability of first-order constructs exceeded the specified cut-off value of 0.70 in all cases, ranging from 0.881 to 0.960. Consequently, the convergent validity of the measurement model has been confirmed by the evaluation. Cronbach's alpha scores of 0.704, 0.759, and 0.767 for shared leadership, open innovation, and employee innovation are generally seen as good.

Table 2: Results of Measurement Model

Variable	Item	Outer Loading	AVE	Composite Reliability	Cronbach's Alpha
Shared leadership	KS2	0.670	0.519	0.878	0.704
	KS3	0.756			
	KS4	0.783			
	KS5	0.742			
	KS6	0.656			
	KS7	0.875			
Open Innovation	OI1	0.881	0.534	0.846	0.759
	OI4	0.672			
	OI7	0.775			
Employee Innovation	WI1	0.769	0.571	0.851	0.767
	WI2	0.795			
	WI4	0.852			
	WI5	0.777			

Note: Items SL2, 3, OI2, 3, 5, WI3, 6, 7, and 8 were deleted due to low loading.

The path coefficients within the structural model serve as a means to validate the relationships between variables. To assess the significance of these path coefficients, t-values were compared to critical t-values corresponding to significance levels of 0.10, 0.05, and 0.01. Hair *et al*. (2016) recommended the use of bootstrapping with 5000 sub-samples to automate the calculation of empirical t-values for assessing the significance of path coefficients.
Table 3 presents the path coefficients, standard errors, R2 values, and the results of the hypothesis tests for employee innovation and open innovation. The R2 values for employee innovation and open innovation were 0.810 and 0.577, respectively. These R2 values indicate

that shared leadership accounted for 81.0% of the variance in employee innovation and 57.7% of the variance in open innovation, respectively. These R2 values are considered large, surpassing the 26% threshold recommended by Cohen (1988) as a general rule of thumb for assessing the effect size.

Moreover, at a significance level of 5% and with a confidence level of 95%, path coefficient values and t-values should be greater than or equal to 1.96 to be considered statistically significant. In the case of employee innovation, it was found to be significantly influenced by shared leadership along each specific structural path (path coefficient = 0.853, t = 2.784, $p < 0.01$). This means that Hypothesis 1 (H1) was fully supported, as the impact of shared leadership on employee innovation was statistically significant.

Table 3: Direct assessment of structural model

H	Path	Beta	SE	T-Value	P-Value	R^2	Decision
H1	SL -> WI	0.853	0.847	2.784	0.000	0.810	Support

Note: H-Hypothesis, SL-Shared Leadership, WI-Employee Innovation.

The results of the mediation effect of open innovation between shared leadership and employee innovation are presented in Table 4. According to the bootstrapping analysis, the indirect effect of open innovation was found to be statistically significant at $p < 0.01$. With values of 0.061 and 0.652, respectively, the confidence interval for this indirect effect extended from a lower limit of 2.50% to an upper limit of 97.5%. These results imply that open innovation does, in fact, act as a mediator in the relationship between employee innovation and shared leadership. Consequently, the data pointed to the support of Hypothesis 2 (H2), which states that employee innovation and shared leadership are mediated by open innovation.

Table 4: Indirect assessment of structural model

H	Path	Beta	SE	T-Value	P-Value	CL 2.50%	97.50%	Decision
H2	SL -> OI -> WI	0.379	0.085	2.893	0.000	0.061	0.652	Support

Note: H-Hypothesis, SL-Shared Leadership, EI- Employee Innovation, OL- Open Innovation, CL- Confidence interval.

Discussions and Conclusion

The focus of this study is to investigate the correlation between employee innovation and shared leadership. The results of Hypothesis 1 (H1) indicate that employee innovation in the Chinese internet service sector is positively influenced by shared leadership. This finding aligns with previous research conducted by Edelbroek *et al*. (2023), Mohammed *et al*. (2022), Berraies *et al*. (2021), and Currie *et al*. (2019). The Chinese internet service sector's approach of eschewing designated leaders in favor of promoting shared responsibility and accountability is likely the reason behind the positive impact observed in this study.

As proposed by Hypothesis 2, the study also looked at how open innovation functions as a mediator in the relationship between employee innovation and shared leadership. The study's findings show that employee innovation and shared leadership are mediated by open innovation. This outcome is in line with earlier studies by Bogers et al. (2018), Edelbroek et al. (2023), and Brunswicker et al. (2018). These results imply that in order to foster employee innovation within their companies, the Chinese internet service industry has actively engaged with external

parties such as customers, rivals, academic institutions, research centers, government agencies, consultants, and suppliers.

In its entirety, this paper addresses the parameters that would encourage employee innovation in the China's internet service sector. The criteria that have been discussed include open innovation, and shared leadership. According to the proposed research paradigm, it was discovered that shared leadership have a direct connection to and a big impact on employee innovation. In fact, open innovation studies have been routinely carried out in big businesses. Studies on the facilitating influence of shared leadership on employee innovation, however, are severely lacking. Additionally, the dearth of research on open innovation as a mediator has led to the focus of this study being on the Chinese internet service sector. Other reasons for doing this study included the dearth of open innovation research as a potential mediator in the Chinese internet service sector.

Theoretical Contribution

This study has made a valuable contribution to the Chinese internet service sector by shedding light on the mediating role of open innovation between shared leadership and employee innovation. Shared leadership is just one of several factors that facilitate employee innovation, and this research has integrated them into a comprehensive research framework. Furthermore, By investigating open innovation as a mediator between the dependent variable (employee innovation) and the independent factor (shared leadership), the study has contributed to the body of knowledge already in existence. The effect of shared leadership on employee innovation performance has been examined in a number of prior empirical studies (Edelbroek et al., 2023; Sherani et al., 2022; Mohammed et al., 2022; Berraies et al., 2021; Ouakouak et al., 2021; Currie et al., 2019). Research examining an open innovation framework as a mediator, however, has been lacking. Lastly, this study has utilized both established and novel hypotheses to elucidate the relationships among its variables, contributing to a more comprehensive understanding of these dynamics.

Practical Contribution

This study not only contributes to theory but also offers practical implications for the Chinese internet service sector, government, and policymakers. It has identified significant factors that influence employee innovation, and the findings can serve as a practical roadmap for fostering employee innovation within organizations. These conclusions provide valuable insights into the key components of successful employee innovation, which are vital for the long-term health and competitiveness of companies in the Chinese internet service sector. Moreover, the study's findings highlight the role of open innovation as a mediator between critical drivers and its substantial impact on employee innovation in the Chinese internet service sector. This knowledge can assist Chinese organizations and government agencies in comprehending how external collaborations and partnerships can effectively support innovation initiatives within the sector. Government policymakers and decision-makers should consider strategies for harnessing external support to further enhance innovation in the industry.

Limitation and suggestions for future study

Firstly, the method used to obtain a substantial sample size. While the study managed to gathered information from a reasonable number of participants, it may not have fully represented the entire industry. In practice, it can be challenging to secure responses from participants when relying solely on online approaches. To address this challenges, future research endeavors could consider expanding the sample by including additional companies within the Chinese internet service sector. Additionally, comparative studies that examine how shared leadership impacts employee innovation in the Chinese internet service sector in relation

to other sectors across the nation could offer valuable insights into the sector's unique dynamics and challenges. This approach would help to ensure robustness and validity of the study's results.

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