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Research on the Effect of Lead Users on Firms' Innovation Performance in a Social Media Environment-Mediated by Firms' Social Media Use

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Abstract

In order to investigate how lead users enhance corporate innovation performance in a social media environment, this study examines the internal mechanism by which corporations utilize social media platforms to access the knowledge content shared by lead users on social media, which affects corporate innovation performance. This study takes user innovation theory, open innovation theory and resource base theory as the theoretical cornerstones, this study analyzes the mechanism of the role of knowledge sharing by lead users on corporate innovation performance, examines the mediating role of corporate social media use on the impact between knowledge sharing by lead users and corporate innovation performance, and constructs a theoretical model with mediating variables. Data were collected through a questionnaire survey and analyzed using SPSS and AMOS. The results of the study show that: 1) lead user's knowledge sharing has a positive and significant effect on corporate social media use and corporate innovation performance; 2) corporate social media use has a positive and significant effect on corporate innovation performance; 3) corporate social media use mediates between lead user's knowledge sharing and corporate innovation performance.

Keywords: *Lead user, firm innovation performance, knowledge sharing, social media*

1. Introduction

With the rapid development of information technology and increasing market competition, innovation has become a critical factor for firms to gain competitive advantages in the era of Industry 4.0. However, many firms face a high failure rate in product innovation, as numerous new products are eliminated from the market due to a lack of insight into consumer needs. The rise of social media has provided new avenues for corporate innovation. Research indicates that social media not only facilitates communication between firms and users but also plays a key role in collecting innovative ideas and promoting new product development. Through social media, firms can effectively engage users in the innovation process, reduce innovation costs, and enhance the success of their innovations.

The relationship between lead user knowledge sharing and enterprise innovation performance has been extensively studied. Lead users, defined by Hippel (1986), possess advanced needs and the ability to innovate, making their shared knowledge valuable for firms. Additionally, Ernst & Brem (2017) emphasize that social media amplifies lead users' influence, enabling firms to access and leverage their knowledge more effectively.

Corporate social media use acts as a mediator in this relationship. Studies by Wang & Pauleen (2016) demonstrate that firms using social media gain competitive insights and improve innovation performance by engaging with lead users. Cheng & Krumwiede (2018) further show that social media facilitates knowledge integration, bridging lead users contributions and firm innovation.

Lead user knowledge sharing is central to open innovation. Hippel (1988) posits that lead users innovate to meet unmet needs, sharing solutions for mutual benefit. In this study, lead user knowledge sharing is operationalized through three dimensions: innovativeness, quality and timeliness, based on scales by Lu & Yang (2011) and Chang & Chuang (2011).

Enterprise innovation performance is measured by outcomes such as new product development and patents. Salomo et al. (2007) link it to financial success, while Xie & Zou (2018) emphasize speed and patent counts. This study adopts Xie & Zou's scale, defining it as improvements in product quantity, patents, revenue share, and success rates of innovations.

Hughes et al. (2012) categorize corporate social media use into informational and social dimensions. Ali-Hassan et al. (2015) expand this to include cognitive and hedonic uses. This study focuses on Hughes' framework, defining it as firms' strategic use of public platforms to engage lead users.

2. Objectives

1) Identify the factors influencing corporate innovation performance that are shared by lead users on social media, based on previous scholarly research and observations on social media platforms.

2) Examine the mediating role of corporate social media use in the relationship between lead users and corporate innovation performance, and explore the theoretical model and influence pathways between lead users and innovation performance.

3) Analyze the research results and provide insights and recommendations on how firms can leverage lead users on social media to enhance innovation performance.

3. Materials and Methods

This study is grounded in an integration of open innovation theory (Chesbrough, 2003), user innovation theory (Hippel, 1988), resource-based view (Barney, 1986), and knowledge management theory (Nonaka, 1995), which collectively posit that lead user knowledge sharing on social media platforms creates value through network effects of external knowledge integration rather than through isolated internal R&D efforts. Digital innovation is identified as a core component of this framework, with prior research emphasizing enhanced innovation efficiency through open collaboration (West & Gallagher, 2006), improved market fit via user co-creation (Franke & Hippel, 2006), and optimized knowledge conversion through social media interactions (Scuotto et al., 2020). The synergy of these mechanisms establishes the theoretical basis for examining how enterprises transform user knowledge into innovation performance.

Liu (2020) posits that knowledge shared by lead users on social media serves dual functions for enterprises: providing valuable innovation resources while simultaneously reducing internal R&D workloads and resource investments. Through effective customer knowledge management utilizing lead user contributions, enterprises can achieve faster market responsiveness and continuous product/service improvements, ultimately enhancing core competitiveness and business performance. Consequently, real-time knowledge shared by lead users on social media offers substantial benefits, enabling enterprises to promptly understand customer preferences and product refinement directions for agile decision-making. This leads to our first hypothesis:

H1: Lead user knowledge sharing has a significant positive effect on enterprise innovation performance.

Kane's (2015) research demonstrates that user-shared knowledge on social media reduces barriers to acquiring external knowledge efficiently. Continuous discussions among lead users and other community members further refine and enhance knowledge quality, with all shared information remaining persistently available on platforms. Social media-based lead user knowledge sharing improves customer engagement, brand awareness, and corporate image, thereby positively influencing organizational social media adoption. These platforms enable direct customer engagement, personalized communication, and performance monitoring, serving as powerful tools for audience targeting and consumer behavior influence. Through user-generated content and knowledge sharing, enterprises establish credibility, foster relationships, and enhance digital marketing effectiveness. Thus, we propose:

H2: Lead user knowledge sharing has a significant positive effect on corporate social media use.

Bashir & Papamichail (2017) establish that corporate social media use positively influences market-driven product innovation and performance enhancement. Social media adoption not only increases opportunities for acquiring advanced technologies and strengthening innovation capabilities, but also provides competitive intelligence and information asymmetry advantages. Furthermore, it reduces barriers to external knowledge acquisition, facilitates partnerships with technology providers, enables competitor monitoring for differentiation strategies, and improves consumer insight integration into innovation processes. Within social media ecosystems, organizational usage enhances openness and information channels, fostering virtuous innovation cycles through lead user relationships. Therefore, we hypothesize:

H3: Corporate social media use has a significant effect on enterprise innovation performance.

Beyond communication tools, social media represents a robust business platform. Wang and Xie (2023) identify that user trust, perceived information utility, and privacy protection significantly influence knowledge-sharing willingness, which reciprocally affects corporate knowledge dissemination strategies. User-generated content plays a pivotal role in knowledge diffusion, operational efficiency, and customer engagement. Active lead user participation elevates both platform value and organizational integration of social media into strategic operations. Accordingly, we propose:

H4: Corporate social media use mediates the relationship between lead user knowledge sharing and enterprise innovation performance.

Based on the aforementioned analysis, lead user knowledge sharing on social media platforms directly contributes valuable external innovation resources to enterprises, significantly enhancing innovation performance. These platforms demonstrate remarkable capacity to attract lead user participation in knowledge-sharing activities due to their real-time interactivity, user autonomy, and cost-effectiveness. From the resource-based theory perspective, social media has become strategically vital for enterprises as corporate usage enables effective absorption of user-shared knowledge and improves innovation outcomes. The mediating role of social media between enterprises and lead users has become increasingly significant in the information age, bridging knowledge sharing and innovation performance. These platforms facilitate various engagements including information acquisition, opinion articulation, and knowledge dissemination. Enterprises' innovation-related activities are now predominantly conducted through social media, where strategic utilization enhances both innovation capabilities and market competitiveness. In conclusion, this study proposes that: lead user knowledge sharing on social media affects enterprise innovation performance; enterprise social media usage affects enterprise innovation performance; enterprise social media usage affects the relationship between lead user knowledge level and enterprise innovation performance.

In summary, this paper proposes a research model, as shown in Figure 1.

H1: Lead user knowledge sharing has a significant positive effect on enterprise innovation performance.

H2: Lead user knowledge sharing has a significant positive effect on corporate social media use.

H3: Corporate social media use has a significant effect on enterprise innovation performance.

H4: Corporate social media use mediates the relationship between lead user knowledge sharing and enterprise innovation performance.

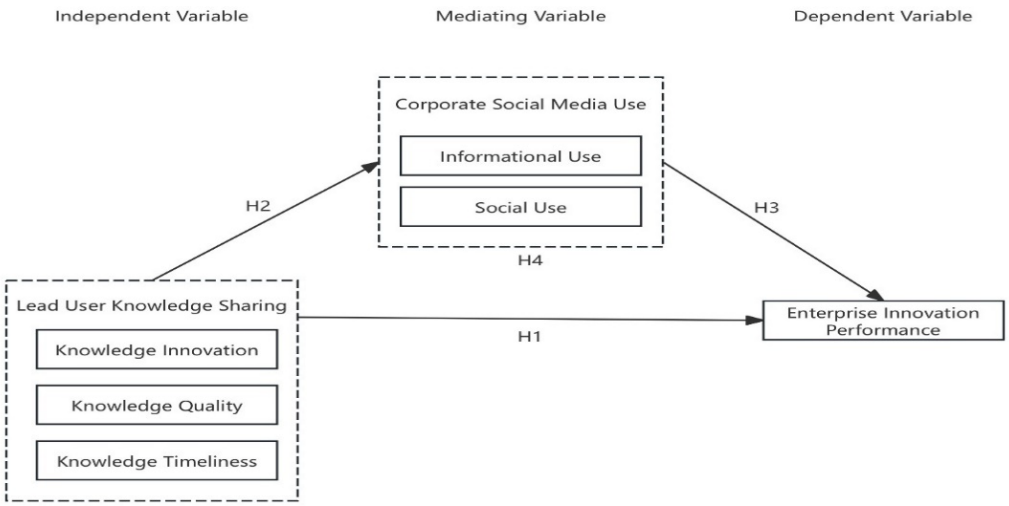

Figure 1 Conceptual Framework

The present study utilized the Questionnaire Star platform to distribute surveys to Chinese firms actively engaging with lead users on social media, with 255 questionnaires distributed and 240 valid responses retained after eliminating 15 responses showing response bias or incompleteness.

The statistical software packages SPSS 26.0 and AMOS 24.0 were employed for confirmatory factor analysis, structural equation modeling, and bootstrapping mediation analysis (5,000 samples) to examine the hypothesized relationships between digital innovation capabilities and performance outcomes.

4. Results and Discussion

4.1 Results

This study distributed 300 questionnaires to full-time employees through the "Wenjuanxing" platform between August and September 2024, employing a combined approach of random sampling and industry-specific targeting that covered equipment manufacturing, new energy, software and IT services. The anonymous survey implemented IP verification and response time controls (>1 minute) to ensure data quality, yielding 258 returned questionnaires (86% response rate). After eliminating 18 invalid responses based on predetermined criteria (missing data >10%, patterned responses, or incomplete departmental information), 240 valid questionnaires remained (93.02% validity rate). Each valid response was cross-verified for company location, size, and industry to confirm sample independence, ensuring all participants represented distinct organizations. For measurement development, we adapted established scales from Carlson et al. (2019), Lu and Yang (2011), Chang and Chuang (2011), Hughes et al. (2012), and Xie (2018), modifying items to fit our research context before conducting comprehensive reliability and validity tests to verify the measurement instruments.

Table 1 Descriptive statistical analysis table of demographic variables

Variable	Category	Frequency	Percentage
Department	R&D Department	77	32.1%
	Technical Department	102	42.5%
	Marketing Department	61	25.4%
Firm Age	Less than 5 years	49	20.4%
	5–9 years	65	27.1%
	10–19 years	65	27.1%
	20 years or more	61	25.4%
Firm Size	Fewer than 50 employees	62	25.8%
	51–100 employees	87	36.3%
	101–300 employees	48	20.0%
	More than 300 employees	43	17.9%
Firm Nature	Private Enterprise	143	59.6%
	Non-private Enterprise	97	40.4%
Industry	Computers, Communications, and Other Electronics	42	17.5%
	Software and IT Services	34	14.2%
	Equipment Manufacturing	50	20.8%
	Home Appliance Manufacturing	51	21.3%
	Biopharmaceuticals	24	10.0%
	New Energy	29	12.1%
	Others	10	4.2%

Source: Author's conduct. The same applies hereinafter.

Descriptive statistical analysis was conducted using SPSS 26.0 software. The survey findings reveal that the respondents were predominantly from R&D (32.1%) and technical departments (42.5%), collectively representing 74.6% of participants, indicating their direct involvement in corporate innovation activities and strong understanding of innovation performance, which enhances data reliability. In terms of company characteristics, most surveyed firms were established for 5-9 years (27.1%) and 10-19 years (27.1%), totaling 54.2%, with only 20.4% being under 5 years old, suggesting mature operational frameworks and market competitiveness. Regarding size, 82.1% of companies employed fewer than 300 staff, specifically distributed as 25.8% with under 50 employees, 36.3% with 51-100 employees, and 20% with 101-300 employees, confirming the predominance of SMEs. Ownership data showed 59.6% private enterprises versus 40.4% non-private. Industry distribution highlighted high-tech sector prevalence, including computers, communications and other electronics

(17.5%), software and IT services (14.2%), equipment manufacturing (20.8%), appliance manufacturing (21.3%), biopharmaceuticals (10%), new energy (12.1%), and other sectors (4.2%).

Reliability analysis was conducted using SPSS 26.0 software. As shown in Table 2, the Lead User Knowledge Sharing scale achieved an overall Cronbach's α of 0.863, with all sub-dimensions exceeding 0.8, indicating excellent reliability. Examination of individual items revealed CITC values above 0.3 and item-deleted α coefficients lower than the overall scale reliability, confirming strong internal consistency. Similarly, the Corporate Social Media use scale showed good reliability (α=0.830), with Informational Use (α=0.790) and Social Use (α=0.859) dimensions both meeting acceptable thresholds. The Enterprise Innovation Performance scale also demonstrated adequate reliability (α=0.809), with all items exhibiting satisfactory CITC values (>0.3) and item-deleted α coefficients below the total scale reliability, further validating the measurement instruments' internal consistency. The reliability analysis results demonstrate that all three scales exhibit good reliability, indicating satisfactory internal consistency of the research data.

Table 2 Reliability test tables for variables and dimensions

Variable	Dimension	Item	Mean	Scale Variance	CITC	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	
Lead User Knowledge Sharing	Knowledge Innovation	KI1	33.179	55.453	0.625	0.845	0.851	0.863
		KI2	33.258	55.213	0.615	0.846		
		KI3	33.15	56.103	0.605	0.847		
		KI4	33.267	55.82	0.595	0.848		
	Knowledge Quality	KQ1	33.267	55.259	0.614	0.846	0.836	
		KQ2	33.333	55.127	0.591	0.848		
		KQ3	33.375	55.767	0.571	0.85		
		KQ4	33.392	54.725	0.611	0.846		
	Knowledge Timeliness	KT1	32.917	59.248	0.448	0.859	0.836	
		KT2	32.963	60.061	0.44	0.859		
Corporate Social Media Use	Informational Use	IU1	22.26	30.167	0.449	0.825	0.790	0.83
		IU2	22.29	28.766	0.529	0.814		
		IU3	22.18	29.445	0.505	0.818		
	Social Use	SU1	22.54	25.957	0.668	0.791	0.859	
		SU2	22.55	27.587	0.593	0.804		
		SU3	22.55	26.149	0.649	0.794		
		SU4	22.54	27.12	0.632	0.797		
Enterprise Innovation Performance		IP1	11.8	7.126	0.628	0.759	0.809	
		IP2	11.85	7.313	0.554	0.781		
		IP3	11.8	6.833	0.629	0.719		
		IP4	11.88	7.646	0.287	0.78		

Notes: KI=Knowledge Innovation; KQ=Knowledge Quality; KT=Knowledge Timeliness; IU=Informational Use; SU=Social Use; IP=Innovation Performance. The same abbreviations apply to subsequent tables.

A preliminary assessment of scale validity was conducted. As shown in Table 3, the Lead User Knowledge Sharing scale exhibited excellent suitability for factor analysis with a KMO value of 0.858 and a highly significant Bartlett's test of sphericity ($\chi^2 = 978.847$, $p < 0.001$). Similarly, the Corporate Social Media Use scale showed strong factorability (KMO = 0.825; Bartlett's $\chi^2 = 677.149$, $p < 0.001$). The Enterprise Innovation Performance scale also achieved acceptable thresholds (KMO = 0.776; Bartlett's $\chi^2 = 312.410$, $p < 0.001$). The analytical results demonstrate that all three scales satisfy the basic requirements for confirmatory factor analysis (CFA).

Table 3 Validity test table

Variable	KMO Value	Bartlett's Test Approx. (χ^2)	Degrees of Freedom (df)	Significance (p)
Lead User Knowledge Sharing	0.858	978.847	45	0
Corporate Social Media Use	0.825	677.149	21	0
Enterprise Innovation Performance	0.776	312.41	6	0

As shown in Table 4, the CFA models were constructed using AMOS 24.0 software. The confirmatory factor analysis results demonstrated good model fit for all three scales: the Lead User Knowledge Sharing scale (χ^2/df=1.202, RMSEA=0.029, CFI=0.993), Corporate Social Media Use scale (χ^2/df=1.056, RMSEA=0.015, CFI=0.999), and Enterprise Innovation Performance scale (χ^2/df=3.316, RMSEA=0.098, CFI=0.985) all exceeded threshold criteria. Additional tests confirmed satisfactory convergent validity (AVE>0.5) and composite reliability (CR>0.7) for all scales, supporting the psychometric robustness of the measurement instruments.

Table 4 Confirmatory factor analysis test table

Variable	Dimension	Item	χ^2/df	RMSEA	IFI	CFI	TLI	ESTIMATE	AVE	CR
Lead User Knowledge Sharing	Knowledge Innovation	KI1	1.202	0.029	0.993	0.993	0.990	0.777	0.590	0.852
		KI2						0.777		
		KI3						0.727		
		KI4						0.79		
	Knowledge Quality	KQ1						0.734	0.561	0.837
		KQ2						0.757		
		KQ3						0.727		
		KQ4						0.778		
	Knowledge Timeliness	KT1						0.759	0.557	0.716
		KT2						0.734		
Corporate Social Media Use	Informational Use	IU1	1.056	0.015	0.999	0.999	0.990	0.699	0.558	0.791
		IU2						0.783		
		IU3						0.757		
	Social Use	SU1						0.8	0.606	0.860
		SU2						0.748		
		SU3						0.814		
		SU4						0.749		
Enterprise Innovation Performance		IP1	3.316	0.098	0.985	0.985	0.955	0.702	0.521	0.812
		IP2						0.645		
		IP3						0.843		
		IP4						0.683		

As presented in Table 5, after confirming that all dimensions of both the Lead User Knowledge Sharing Scale and Corporate Social Media Usage Scale met the convergent validity (AVE>0.5) and composite reliability (CR>0.7) criteria, discriminant validity testing revealed that the standardized correlation coefficients between any two dimensions were lower than the square root of the corresponding AVE values, demonstrating adequate discriminant validity for all dimensions of both scales.

Table 5 Interval validity test table

Dimension	AVE square root	Knowledge Innovation	Knowledge Quality	Knowledge Timeliness	Informational Use	Social Use
Knowledge Innovation	0.768	0.59	0.497	0.577		
Knowledge Quality	0.749	0.497	0.561	0.48		
Knowledge Timeliness	0.747	0.577	0.48	0.557		
Informational Use	0.767				0.588	0.47
Social Use	0.778				0.47	0.606

The normality of each measurement dimension was assessed using SPSS 26.0 software by examining skewness and kurtosis coefficients. As shown in Table 6, the absolute values of skewness (all < 3) and kurtosis (all < 8) for all constructs fell within the thresholds suggested by Kline (2023), indicating that the data approximately followed a normal distribution. This supports the use of parametric statistical methods for further analysis.

Table 6 Normality test table

Dimension	Mean	Standard Deviation	Skewness	Kurtosis
Knowledge Innovation	3.686	1.028	-0.821	-0.725
Knowledge Quality	3.558	1.064	-0.709	-0.925
Knowledge Timeliness	3.96	0.973	-1.261	0.931
Informational Use	3.908	0.96	-1.342	0.893
Social Use	3.606	1.088	-0.709	-0.937
Enterprise Innovation Performance	3.944	0.869	-1.325	1.183

Pearson correlation analysis conducted with SPSS 26.0 revealed (Table 7): All sub-dimensions of Lead User Knowledge Sharing (Knowledge Innovation r=0.491, Knowledge Quality r=0.449, Knowledge Timeliness r=0.717) showed significant positive correlations with Enterprise Innovation Performance ($p<0.01$), with an overall correlation of 0.700. Significant correlations were also observed between Lead User Knowledge Sharing and Corporate Social Media Use (r=0.643, $p<0.01$). Both dimensions of Corporate Social Media Use (Informational Use r=0.540, Social Use r=0.435) were positively correlated with Enterprise Innovation Performance ($p<0.01$), yielding an aggregate correlation of 0.581. All inter-variable correlations were smaller than the square roots of AVE (bold values on diagonal), confirming satisfactory discriminant validity without multicollinearity concerns.

Table 7 Pearson's correlation test by sub-dimension

Variable	Knowledge Innovation	Knowledge Quality	Knowledge Timeliness	Lead User Knowledge Sharing	Informational Use	Social Use	Corporate Social Media Use	Enterprise Innovation Performance
Knowledge Innovation	**0.768**							
Knowledge Quality	0.491**	**0.749**						
Knowledge Timeliness	0.389**	0.373**	**0.747**					

Table 7 Pearson's correlation test by sub-dimension (continued)

Variable	Knowledge Innovation	Knowledge Quality	Knowledge Timeliness	Lead User Knowledge Sharing	Informational Use	Social Use	Corporate Social Media Use	Enterprise Innovation Performance
Lead User Knowledge Sharing	0.804**	0.805**	0.737**	**0.623**				
Informational Use	0.548**	0.369**	0.327**	0.531**	**0.767**			
Social Use	0.442**	0.417**	0.407**	0.539**	0.385**	**0.778**		
Corporate Social Media Use	0.590**	0.473**	0.444**	0.643**	0.809**	0.855**	**0.644**	
Enterprise Innovation Performance	0.491**	0.449**	0.717**	0.700**	0.540**	0.435**	0.581**	**0.716**

Note: **p<0.01, *p<0.05 (two-tailed); Bold values on diagonal represent square roots of AVE.

The hierarchical regression analysis conducted with SPSS 26.0 initially included control variables (Department, Firm Age, Firm Size, Firm Nature, Industry) in Model 1 through Model 3, none of which showed statistically significant effects on the dependent variables. Following Cohen's (2013) methodological recommendations for model parsimony when control variables demonstrate no significant associations, they were excluded from final analyses. As shown in Table 8, results revealed that both Lead User Knowledge Sharing (β=0.635, t=11.412, p<0.001) and Corporate Social Media Use (β=0.491, t=8.590, p<0.001) had significant positive effects on Enterprise Innovation Performance, supporting hypotheses H1 and H3 respectively, while Lead User Knowledge Sharing also significantly enhanced Corporate Social Media Use (β=0.673, t=12.553, p<0.001), validating H2. The adjusted R^2 values (0.230-0.394) across models indicated moderate to strong explanatory power.

Table 8 Hierarchical regression analysis test table

Variables	Enterprise Innovation Performance M1		Corporate Social Media Use M2		Enterprise Innovation Performance M3	
	β	T	β	T	β	T
Lead User Knowledge Sharing	0.635	11.412***	0.673	12.553***		
Corporate Social Media Use					0.491	8.590***
R^2	0.366		0.409		0.249	
Adj R^2	0.349		0.394		0.23	
F	22.388***		26.893***		12.876***	

Note: ***p<0.001 **p<0.01, *p<0.05. The same applies hereinafter.

To examine the mechanism through which lead user knowledge sharing influences enterprise innovation performance, this study incorporated corporate social media use as a mediator and conducted mediation analysis using Model 4 of the PROCESS macro in SPSS 26.0. As shown in Table 9, lead user knowledge sharing had a significant total effect on enterprise innovation performance (β=0.628, p<0.01), indicating a substantial impact. Moreover, lead user knowledge sharing significantly predicted corporate social media use (β=0.667, p<0.01). When both lead user knowledge sharing and corporate social media use were included in the model, the direct effect of lead user knowledge sharing on innovation performance remained significant (β=0.500, p<0.001), while

corporate social media use also exhibited a significant effect on innovation performance (β=0.191, p<0.05), confirming its partial mediating role. The path relationships among these variables are illustrated in Figure 2.

Table 9 Results of Mediation Effect Analysis

Step	Dependent Variable	Independent Variable	R	R-sq	F	β	t
Step 1	Enterprise Innovation Performance	Lead User Knowledge Sharing	0.597	0.357	132.067***	0.628	11.492***
Step 2	Corporate Social Media Use	Lead User Knowledge Sharing	0.636	0.404	161.204***	0.667	12.697***
Step 3	Enterprise Innovation Performance	Lead User Knowledge Sharing	0.615	0.379	72.192***	0.500	7.180***
		Corporate Social Media Use				0.191	7.180*

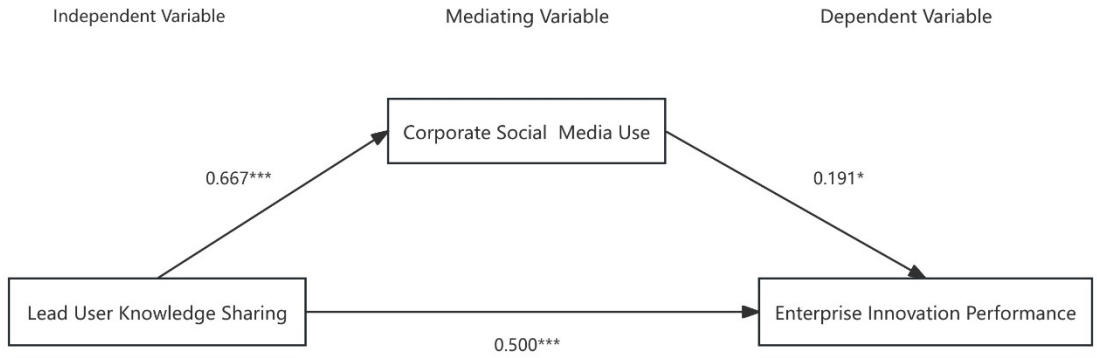

Figure 2 Path Model of Lead User Knowledge Sharing on Enterprise Innovation Performance

To verify the mediating role of corporate social media use, this study conducted a Bootstrap analysis with 5,000 resamples using Model 4 of the PROCESS macro. The results (Table 10) showed that the 95% confidence interval for the indirect effect of lead user knowledge sharing on enterprise innovation performance did not include zero, confirming both a direct effect (β=0.50, 79.36% of total effect) and a significant mediation effect through corporate social media use (β=0.13, 20.63% of total effect), thereby supporting Hypothesis H4.

Table 10 Bootstrap analysis

Effect Type	Point Estimate	SE	95% CI	Effect Ratio
Total Effect	0.628	0.055	[0.520,0.735]	
Direct Effect	0.500	0.070	[0.363,0.647]	79.618%
Indirect Effect	0.128	0.056	[0.028,0.247]	20.382%

Based on the above research results, it can be seen that hypotheses H1, H2, H3 and H4 are all valid. Therefore, all hypotheses are supported by the data analysis.

4.2 Discussion

The results of the above data analysis show that:

1) The role of Lead User Knowledge Sharing in promoting Corporate Social Media Use. The study reveals that knowledge shared by lead users on social media significantly enhances corporate social media usage, with knowledge innovativeness, quality, and timeliness serving as key facilitating factors. When lead users disseminate innovative knowledge through social media platforms, it effectively stimulates corporate innovation

activities regarding products and services, expands corporate innovation collection channels and knowledge integration tools, thereby deepening corporate engagement with social media. High-quality knowledge content shared by lead users reduces the difficulty of knowledge screening and comprehension for enterprises, broadens knowledge acquisition channels, and strengthens corporate reliance on social media. The latest market feedback and user demands shared by lead users enable enterprises to capture user opinions in real-time, clarify innovation directions, and shorten innovation cycles, ultimately leading to more frequent and diversified social media usage. These findings demonstrate that lead users' knowledge-sharing behavior enhances corporate social media utilization efficiency across multiple dimensions. The study found lead users' knowledge sharing shapes corporate social media use through three dimensions: cutting-edge knowledge drives platform adoption, high-quality content improves evaluation mechanisms, and real-time interaction needs optimize communication functions. This transformation shifts enterprises from passive reception to active construction of professional knowledge management systems, supporting Davenport & Ronanki's (2025) propositions on knowledge management evolution.

2) The impact of Corporate Social Media Use on Enterprise Innovation Performance. The research indicates that both informational and social use of social media by enterprises significantly improves innovation performance through distinct pathways of knowledge acquisition and relational interaction. By actively acquiring innovative technologies, cross-domain knowledge content, and real-time user feedback shared by lead users on social media, enterprises can rapidly identify market opportunities and optimize innovation decision-making processes. This informational use helps enterprises precisely adjust R&D directions, absorb cross-domain knowledge resources, and stimulate breakthrough innovation ideas, thereby directly enhancing innovation efficiency and quality. Meanwhile, interactive relationships established with lead users through social media facilitate the flow of tacit knowledge and open collaborative innovation. Through in-depth interactions with lead users, enterprises gain access to unarticulated user needs, accelerating the commercialization of innovative technologies. This relational approach strengthens enterprises' open innovation capabilities, promoting long-term growth in innovation performance. In summary, informational use empowers short-term innovation through knowledge provision, while social use sustains innovation through relational networks, together forming a dual-path mechanism through which corporate social media use enhances innovation performance. Corporate social media use supports innovation through informational use for decision-making and social use for network building, forming an integrated innovation support system. Notably, Informational Use outperformed Social Use, providing new evidence for Chesbrough's (2003) open innovation theory.

3) The mediating role of Corporate Social Media Use between Lead User Knowledge Sharing and Enterprise Innovation Performance. This study verified the partial mediating effect of Corporate Social Media Use through Bootstrap analysis (effect value 0.128, accounting for 20.63% of total effect), with knowledge timeliness showing the strongest predictive power, extending Von Hippel's (1986) lead user theory and echoing digital innovation research by Scuotto (2017). Path analysis revealed dual mechanisms: direct effects and indirect effects through enhanced social media use, aligning with Barney's (1991) resource-based view and Nambisan (2016) digital platform capability theory. Mediation analysis confirmed corporate social media use's critical role between knowledge sharing and innovation performance. Further analysis demonstrates that corporate social media use plays a crucial mediating role between lead user knowledge sharing and innovation performance. Lead user knowledge sharing not only directly affects innovation performance but also indirectly enhances it by promoting corporate social media use. Specifically, knowledge innovativeness primarily boosts innovation performance by intensifying corporate social media usage. The cutting-edge technological insights and market trends shared by lead users prompt enterprises to more frequently acquire industry information through social media, thereby shortening R&D cycles and improving innovation efficiency. Knowledge quality indirectly fosters innovation by optimizing corporate social use of social media. High-quality knowledge content attracts enterprises to actively interact with lead users, forming sustained knowledge exchange networks that generate more market-adaptive innovation solutions. Knowledge timeliness simultaneously influences both informational and social use. Real-time updated user demand data enables enterprises to quickly adjust social media strategies, capturing innovation opportunities through information monitoring while validating innovation directions through instant interactions, achieving dynamic improvement in innovation performance. Therefore, when leveraging lead user knowledge, enterprises must concurrently optimize social media usage strategies: establishing efficient information screening mechanisms to capture critical knowledge while cultivating interactive communities to

deepen knowledge conversion. This "knowledge acquisition-platform use-innovation output" synergistic mechanism provides important implications for open innovation practices.

5. Conclusion

This investigation provides empirical evidence that lead users' knowledge contributions on social media platforms substantially enhance corporate innovation outcomes through three distinct mechanisms. The analysis reveals that the novelty, quality, and timeliness of user-generated content directly stimulate product and process innovations. Furthermore, findings demonstrate that firms' strategic utilization of social media channels partially mediates this relationship by facilitating more efficient knowledge absorption and implementation. Perhaps most significantly, the study uncovers a multiplier effect—when organizations actively cultivate digital interactions with lead users, they achieve disproportionately higher innovation returns from these knowledge exchanges. This study addresses a critical research gap in traditional innovation management literature by elucidating the tripartite dimensions of lead user knowledge in social media platforms: innovativeness, quality, and timeliness. The findings significantly expand the theoretical boundaries of lead user theory by systematically examining the dynamic mechanisms of knowledge transfer through digital channels.

Based on the research findings, corporate innovation management in social media environments should focus on the following two key aspects:

1) The findings of this study demonstrate that knowledge shared by lead users on social media platforms, particularly in terms of quality, innovativeness, and timeliness, significantly enhances corporate innovation performance. It is recommended that enterprises establish a knowledge mining and real-time interaction system for lead users during product development activities. Companies should develop intelligent lead user identification mechanisms by employing natural language processing technologies to monitor innovation-related keywords in lead users' social media content, including patent terminology and technical pain point descriptions. This approach facilitates the extraction of high-quality, innovative, and timely knowledge beneficial for product innovation, supporting Schmid et al.'s (2022) findings regarding the dual-track model combining algorithmic screening with manual verification to improve knowledge acquisition efficiency. This study further emphasizes the need for enterprises to design differentiated identification criteria according to various stages of the innovation process, enabling more targeted knowledge retrieval and deeper mining. Such systematic approach promotes high-quality knowledge transfer, enhances knowledge acquisition efficiency, shortens product development cycles, and ultimately strengthens competitive advantages in the market.

2) This study reveals that both informational and social uses of corporate social media serve as mediators between lead user knowledge sharing and innovation performance. Therefore, it is recommended that enterprises adopt a dual social media strategy during product development and innovation stages, dynamically adjusting their usage patterns according to innovation objectives. During product improvement phases, companies should emphasize social use through establishing user communities, collecting feedback, and conducting brand marketing. In technological breakthrough phases, the focus should shift to informational use for acquiring cutting-edge market knowledge. This strategic approach aligns with Zhengwei's (2022) research on the internal-external differentiation effect in corporate social media usage, where internal integration better supports incremental innovation while external openness facilitates radical innovation. Essentially, this differentiated strategy reflects the dynamic alignment between organizational innovation objectives and social media functional characteristics.

6. Limitations and future research directions

6.1 Limitations

Although this study was conducted with rigorous considerations, several limitations should be acknowledged:

1) Sample Limitations. This research primarily relied on questionnaires distributed via Wenjuanxing on the WeChat platform. Although 240 valid responses were collected, meeting the threshold for model validation, the sample size remains relatively small. This may affect the generalizability and representativeness of the findings.

2) Methodological Limitations. Data were collected through cross-sectional surveys. While prior literature suggests that innovation performance can effectively measure a firm’s innovation capability, cross-sectional data cannot capture the dynamic changes in corporate innovation capacity when influenced by lead user

knowledge sharing. Additionally, firms' ability to identify and absorb lead users' knowledge may influence the reliability of the conclusions.

3) Content Limitations. Although the study's hypotheses were validated, factors such as firms' emphasis on social media and their proficiency in using these platforms may influence the outcome variables. Furthermore, this study did not account for the diversity of social media platforms or firms' social media management capabilities. Due to the generalizability of survey respondents, certain conclusions may exhibit some degree of bias.

4) The cross-sectional design cannot capture how innovation capabilities evolve through sustained user engagement.

In summary, these limitations also suggest directions for future research, such as expanding the sample size, adopting longitudinal data for dynamic analysis, and further exploring the impact of social media diversity and management capabilities on research outcomes.

6.2 Future research directions

1) Future research related to this study will introduce new variables concerning corporate structure and operational models. This study only examined corporate social media usage as a mediating factor between lead user knowledge sharing and enterprise innovation performance, presenting a relatively simplified model. Future research will adopt a hierarchical explanatory approach by incorporating moderating variables such as corporate structure to analyze the differential adjustment effects on innovation performance across various types of enterprises.

2) This study limited the scope of lead users to individual users. Future research will expand the definition of lead users to include corporate entities and groups.

3) Expanding the research population. This study surveyed corporate employees, focusing solely on knowledge sharing from external lead user groups. Future studies will broaden the scope of lead user knowledge sharing to include external organizations, enterprises, and internal knowledge sharing among employees within firms.

4) Future research should employ longitudinal designs to trace capability development trajectories, examine how different organizational structures moderate innovation outcomes, and investigate emerging forms of inter-organizational innovation networks in the digital economy. Such inquiries will further clarify how digital platforms are reconfiguring innovation ecosystems.

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